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The ABC Drafting Practices (page 321)

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IN THIS ISSUE

Features

The ABC Conference on Unification of Drafting Practice
By C. E. Hilton 321

Areas of Agreement and Disagreement in the Drawing Standards of the USA, UK, and Canada.
By Leon DeMause and R. P. Trowbridge 325

True Position on Drawings. By N. E. Brown and Joseph Stannard 327

Maximum Material Condition on Drawings. By P. G. Belitsos 329

Geometric Forms. By Stuart C. Miller 333

Standards Engineers Society—Sixth Annual Meeting 336

SES Awards Fellowships 340

News

News Briefs 341

Gaillard Seminar on Industrial Standardization 341

What's New on American Standards Projects 346

Departments

From Other Countries 342

Books 343

American Standards Under Way. Status as of October 25 344

Standards Outlook. By Leo B. Moore 347

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MARGINAL NOTES

For Better Understanding—

The English-speaking peoples of the United Kingdom, Canada, and the United States often laugh at differences in the English language they all speak. A famous song in today's most popular musical comedy pokes fun at England's English with the question, "Why can't the English learn to speak?" and at USA's English in the line "In America they haven't spoken it for years."

Men concerned with standards in the three countries are not laughing at the causes of technical misunderstandings, however—they are doing something to prevent them.

The ABC conference on drafting practices held in Toronto in September (page 321), and a meeting in New York on screw threads that followed, are the most recent in a long series of conferences and agreements since World War II. As a result of the work accomplished, screw threads in all three countries are almost entirely interchangeable; and if recommendations accepted at the Toronto meeting are now put into effect in the standards of the three countries, technical drawings will be equally interchangeable and easily understood.

ASA Sectional Committee Y14 on Drawings and Drafting Practice will study the recommendations at its meeting December 2, to consider whether they can be incorporated into the American Standard drafting practice.

ABC agreements are, of course, only a first step in bringing about understanding of technical problems on an international level. In technical committees of the International Organization for Standardization, the 40 member countries work on international recommendations to help bring about greater uniformity in their national standards. Recently, ISO Technical Committee 1 on Screw Threads accepted the principle of including both the Unified Screw Thread System and the Metric Screw Thread System in ISO Recommendations on an equal footing.

Index to Magazine of Standards—

The Index to the 1957 volume of THE MAGAZINE OF STANDARDS, Volume 28, will be published as Part 2 of the February 1958 issue. It will be bound separately for your convenience.

Future Features

Reports of the National Conference on Standards at San Francisco will be the feature of the December 1957 issue.

An up-to-date Price List and Index to American Standards, listing, all American Standards published up to November 1, will be sent to MAGAZINE OF STANDARDS subscribers as Part 2 of the January 1958 issue.

The Front Cover

Delegation leaders of the United Kingdom, Canada, and USA at the ABC conference on drafting practice at Toronto, Canada. (Left to right)—T. R. Houston, The English Electric Company, Ltd (UK); Lt Col A. N. Huddleston, Canadian Army (Canada), chairman of the conference; Professor R. P. Hoelscher, University of Illinois (USA), chairman, ASA Committee Y14.

The Canadian committee in charge of arrangements for the conference worked under the chairmanship of J. G. Morrow, Steel Company of Canada. George Noble, Dominion Engineering Works, Ltd, was co-leader of the Canadian delegation. E. A. Sprenger, Dominion Engineering Works, Ltd, is chairman of the Canadian Standards Association's committee on drawings. Secretariat for the conference was held by Canada, represented by G. Moes, assisted by F. Philippbar (USA) and Charles Agar (UK).

This Month's Standards Personality

GEORGE P. KEOGH, graduate mechanical engineer, is widely known for his work on behalf of industrial safety. One of his guiding principles is that safety is universal and not confined to any region. Therefore, he insists, the great need is for safety codes that are American Standards, representing a nationwide viewpoint, not local or individual views. As chief of the New York State Industrial Code, Mr Keogh proposes use of American Standard requirements in the Code wherever possible. The Industrial Code rules are engineering standards adopted and promulgated into law by the Board of Standards and Appeals of the New York State Department of Labor. Mr Keogh has been in charge of the development and preparation of proposed rules for the Code since 1931.

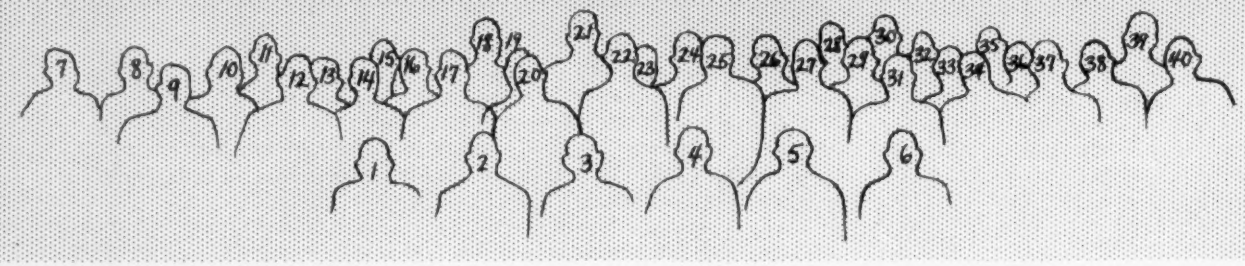
Mr Keogh started his work in standards at the National Bureau of Standards in 1914. He assisted in various projects that had as their fundamental purpose the development of standards concerning composition and physical properties of engineering materials. This early experience with standards had a deep effect on his later professional life, turning his attention from mechanical engineering to the field of standards.

Under his direction the first proposed safety standards for the control of silica dust in rock drilling were produced, followed by standards for control of silica dust in stone cutting and stone crushing, and in foundries. In the middle 'thirties, he directed a project sponsored by the New York State Department of Labor for a Uniform Building Code to be used by local cities and communities in New York State, now widely in effect throughout the state.

During the National Recovery Administration, Mr Keogh served on a committee on safety and health standards under the chairmanship of Dr Isador Lubin. At that time Dr Lubin was Commissioner of Labor Statistics; now he is Industrial Commissioner of the New York State Labor Department.

Mr Keogh's work on safety standards has not been confined to New York State. In line with his philosophy that safety is universal, he has actively participated in development of safety standards under the procedures of the American Standards Association. On these committees he has represented the International Association of Governmental Labor Officials. Of the many safety standards in which he has participated, he has been most actively associated with two throughout the last 20 years. These are the American Standard Safety Code for Elevators, Dumbwaiters, and Escalators, and its companion, the American Standard Practice for Inspection of Elevators (The Inspectors' Manual), both widely used and recognized as important guides to safe installation and operation of elevators.

Mr Keogh spends his spare time in the Adirondack Mountains fishing and hunting, or entertains himself at home with his hobby of many years, philately.



The ABC Conference at Toronto—
1. *J. G. Morrow (Can.);* **2.** *G. F. Hussey, Jr (USA);* **3.** *T. R. Houston (UK);* **4.** *A. N. Huddleston (Can.);* **5.** *R. P. Hoelscher (USA);* **6.** *S. J. Harley (UK);* **7.** *C. L. Miller (USA);* **8.** *D. Harley (Can.);* **9.** *C. H. Heller (USA);* **10.** *C. E. Hilton (USA);* **11.** *L. DeMause (USA);* **12.** *S. Parker (UK);* **13.** *H. Springer (USA);* **14.** *F. Philippbar (USA);* **15.** *G. Moes (Can.);* **16.** *B. Orr (USA);* **17.** *R. S. Paffenbarger (USA);* **18.** *R. P. Trowbridge (USA);* **19.** *C. C. Muller (USA);* **20.** *E. M. Bagley (UK);* **21.** *F. D. Floto (USA);* **22.** *W. Charlson (UK);* **23.** *C. Telfer (USA);* **24.** *E. H. Jones (USA);* **25.** *S. H. Watson (USA);* **26.** *J. W. McNair (USA);* **27.** *K. W. Joy (Can.);* **28.** *J. E. Stannard (USA);* **29.** *A. P. Corridon (USA);* **30.** *A. Moline (Can.);* **31.** *J. H. Shields (Can.);* **32.** *C. McMahon (USA);* **33.** *J. D. Wilding (USA);* **34.** *G. Noble (Can.);* **35.** *C. H. Springer (USA);* **36.** *N. Brown (USA);* **37.** *P. G. Belitsos (USA);* **38.** *S. C. Miller (USA);* **39.** *C. H. Agar (UK);* **40.** *F. H. Smith (USA).*

For identification of USA delegates see page 335.

Stanley Parker, *British Admiralty, (left) receives scroll for leadership on unified drafting practices, presented on behalf of the Conference by Lt Col A. N. Huddleston.*

ABC

AMERICAN | BRITISH | CANADIAN

The ABC Conference on Unification of Drafting Practice

by **C. E. Hilton**

"WE'VE now given the draftsmen the tools to keep out of trouble." So stated Mr Stanley Parker of the British Admiralty, UK delegate to the ABC Conference held in Toronto, Canada, October 7 through 11. And Mr Parker's words carried weight in this gathering. This was shown by its presentation to him at the conclusion of the conference of an illuminated scroll citing him for having "propounded many of the principles upon which the standards of the three countries are based."

It was therefore with a deep sense of accomplishment that Lt Col A. N. Huddleston, leader of the Canadian delegation and chairman of the conference, could announce to the press the successful culmination of a project extending over the last 12 years. This was work done in patient pursuit of ready understandability of drawings prepared in the USA, United Kingdom, or Canada, when used in the factories of any one of the three. There was only one proviso in this announcement. Understandability would result if the recommendations of the conference were found acceptable by the responsible committees of the American Standards Association, the British Standards Institution, and the Canadian Standards Association, and were incorporated in their respective national standards. In the case of the USA, this means Sections 1 through 6 of the American Drafting Standards Manual, ASA Y14. In the UK it is British Standard BS 308, and in Canada, Canadian Standard B78.

In short, the conference closed with the clear understanding that implementation of its recommendations, though not assured, could best be handled as follows:

1. The delegation of each country would return home with a commitment to recommend adoption of certain specific changes in its respective standard that would result in identical requirements.
2. On certain troublesome points, complete agreement on common solutions could not be reached. These would be cited and illustrated in an Addendum to each standard, thus precluding any possibility of misinterpretation.
3. New areas and techniques considered by the conference and decisions reached on specific recommendations would be considered in the three countries for possible future adoption.

Specific Changes in National Standards to be Recommended

Format of Drawings—Although the size and format of drawings for both Canada and the USA are essentially the same, those of the UK differ to some extent (as cited on page 325). The conference agreed that such differences were generally justifiable. However, it was agreed that each standard should stipulate that "a title and a drawing number should appear in the bottom right-hand corner of each drawing." (It is interesting to note that the UK delegation justified its differing location of the revision block as resulting from the switchover from first angle to third angle projection.) Methods of zoning drawings, while different, were considered of no consequence since they serve a common purpose.

Projection—While recognizing a growing trend in the UK toward the third angle projection method used in the USA and Canada, the UK is not yet in a position to recommend exclusion of first angle projection from British Standard 308. However, the delegations agreed to consider placing a statement on each drawing of the method of projection used. (Private conversations with UK delegates indicated that no trouble has been experienced there since their military services converted to the third angle system.)

Line Conventions—While minor differences persist between the types of lines used by the three countries (as

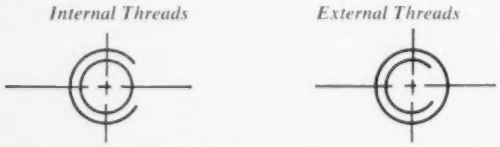
cited on page 325) the conference concluded that these were not apt to cause confusion. The UK and Canadian delegations agreed to consider inclusion of specific instructions relative to the terminations and intersections of hidden lines and center lines as detailed in the American Standard but omitted in one or both of the others.

Sections—General agreement on Sectioning Practices has already been attained with one exception. As an optional method, both Canada and the USA permit alternate section lining of ribs. Both agreed to discourage this practice.

Screw Thread Representation—In a two-way compromise, recommendations were developed on section lining of internally threaded parts of assembly drawings shown in simplified representation. Present British and Canadian practice terminates the sectioning at the major diameter of internal threads whereas Americans terminate at the minor diameter. Furthermore, the USA uses hidden lines to indicate the major diameter, whereas the UK and Canada use solid lines for both diameters.

The Americans urged a change to prevent any possibility of conveying the interpretation that a keyway was involved. The differences were resolved by the USA agreeing to recommend solid lines for both minor and major diameters of internal threads and UK and Canada agreeing to recommend that sectioning be brought to the minor diameter.

This led to the further agreement and compromise wherein USA agreed to recommend use of the UK and Canadian convention for representing the end view of threaded members. This is use of a solid circle and a concentric arc of approximately 300 degrees as shown below.



Miscellaneous—The delegations agreed, if applicable, to recommend consideration by their respective national committees of the following practices:

- Use wavy line under a dimension, for example use: 6 to indicate "not to scale" rather than (NTS).
- Use a dot rather than an arrow at the end of a leader terminating within an outline.
- Substitute parentheses around a dimension (6.00) instead of the abbreviation "REF" to indicate "for reference only."
- Indicate on each drawing the standard used in its preparation. It was understood that "standard" includes "specifications" which, in turn, would reference the standard.
- Use a new symbol $\sqrt{\ }^{F}$ meaning a finish achieved by machining and used to convey information covering surface finish and geometric control by manufacturing processes. A qualification as to maximum allowable roughness may be utilized, if required.

Addenda to the National Standards

Since the specific changes noted previously will take time to implement, it is expected that the present differences will first be made part of the Addendum to each standard. However, the greater share of the Addendum will deal with methods of indicating maximum metal condition and tolerances of form and position on which the three countries presently agree completely in principle but differ in notations.

For example, unanimous agreement was reached on the following statement prepared by a Work Group of the Conference:

Report of Work Group on Maximum Material Condition

Maximum Material Condition is that condition where the part contains the maximum amount of material. For example, the maximum material of a shaft occurs at its high limit of size and that of a hole at its low limit of size.

Interpretation of Form and Position Tolerances When Applied to Features Having Limits of Size—In any application of form or position tolerances to features which are defined by limits of size, the limits of size must be observed independently of the form or position tolerance. However, tolerances of form and position, where specified on drawings, permit an increase (or decrease) in the "virtual" or "effective" size of features beyond the maximum material limit specified.

For example,

(a) the virtual size of a shaft may be larger than its specified maximum material limit by the amount of the form or position tolerance;

(b) conversely, the virtual size of a hole may be correspondingly decreased.

The actual sizes, however, (as measured) must remain within the specified limits of size.

In addition, it was agreed to recommend use of the

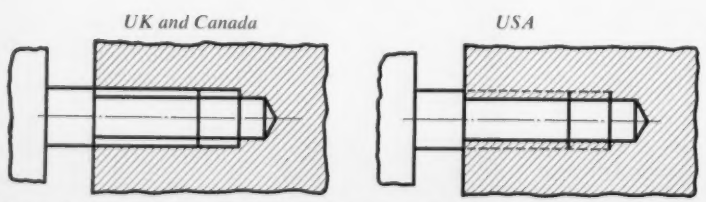


Figure 1—*Simplified representation of Internally Threaded Assembly in Section.*

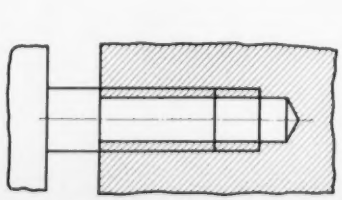


Figure 2—*Compromise on Representation and Sectioning.*

following general notes and abbreviations on drawings:

- Requirement marked "MMC" applies when feature is at maximum material condition.
- Requirement marked "RFS" applies regardless of feature size.
- Dimensions marked "TP" define true position and are not subject to general tolerance.

Two factors made it impossible, at present, despite strenuous efforts, to agree on similar notations applicable to specifications of position and form. First is the fact that the American Standard recognizes both the radial and diametral concepts in establishing positional tolerance zones with no present indication of being able to single out the diametral concept adopted in the UK and Canada. The second is the preference of USA delegates for the term "Total" as contrasted with UK's designations "WIDE" or "DIA" to indicate whether a surface or an axis is involved.

As examples, only a few are cited (see Figure 3).

ITEM	USA	UK	CANADA
TRUE POSITION	LOCATED AT TRUE POSITION WITHIN .010 DIA **or** LOCATED WITHIN .005R OF TRUE POSITION	POS TOL .010 DIA	LOCATE WITHIN .010 DIA
STRAIGHTNESS	STRAIGHT WITHIN .003 TOTAL	STR TOL .003 DIA	STRAIGHT WITHIN .003
FLATNESS	FLAT WITHIN .003 TOTAL	FLAT TOL .003 WIDE	FLAT WITHIN .003

Figure 3—*Notes Illustrating Differences In Concept and Wording.*

ITEM	USA	UK	CANADA
TRUE POSITION WITH TWO DATUMS	LOCATED AT TRUE POSITION WITHIN .005 DIA AT MMC IN RELATION TO DATUM A AT MMC AND DATUM B REGARDLESS OF FEATURE SIZE	POS TOL .005 DIA (MMC) DATUMS A (MMC) AND B	LOCATE WITHIN .005 DIA (MMC) DATUMS A, MMC AND B

Figure 4—*Notes Illustrating Use of "MMC" and "Regardless of Feature Size."*

American Standard Y14.5-1957 requires a notation on the drawing whenever tolerances apply "regardless of feature size" whereas BS 308 and CSA B78.1 presently assume this when not specified. Thus again we find the standards differing and will so demonstrate in the Addenda as in Figure 4.

Agreement of the delegations on the general notes previously mentioned, however, will lead to greater similarity, since (RFS) will eventually be added to British and Canadian drawings where applicable.

The foregoing are merely examples of a considerable variety of notes that will be included in the addendums. A Task Force of the conference drew up a series of sheets intended to include all differences. These will serve as guides to each country.

Finding themselves agreed in principle on all issues and recognizing the continuing need for variations in notations, the delegates devoted considerable time to making certain that all the countries applied the same interpretation to rather special but knotty problems. For example, the relationship of size tolerances to form tolerances was one of these. How is a drawing bearing only a size tolerance to be interpreted? To what extent was its form controlled? What precautions should be taken if perfect form is required and how far should one go in specifying permissible deviation?

Although it was impossible to come to complete agreement on specific wordings and techniques to handle these cases, it was decided to continue toward this objective through correspondence.

Subjects for Consideration and Possible Adoption

What must appear to the reader as a natural outgrowth of the foregoing—agreement on principles but continuing dissimilarities of notation—is the problem of symbols that might be substituted for the various notations and mean the same thing to everyone. Indeed, this was the subject of long but profitable discussions.

Before entering upon the discussions and decisions, it is interesting to note the reasons behind the various approaches to this subject. Our military services first introduced symbols to indicate form and position tolerances in MIL-STD-8A as an optional method intended to make the drawings less cluttered with notes.

The USA and UK committees had considered symbols but had decided not to include symbols in their standards. Both felt the concepts were too new to be further complicated by symbols. The ISO Committee, ISO/TC 10 Drawings, is proposing the adoption of symbols to eliminate language difficulties.

Delegates at the ABC Conference also faced the language barrier, even though limited to the English language. In addition, they did not want ISO adopting symbols they would not use. Therefore, the matter of symbols and their use in feature control symbol blocks was taken up with a clear understanding that the discussion, while intended to stabilize symbols, carried no commitment to immediately adopt and use the symbols in the three countries.

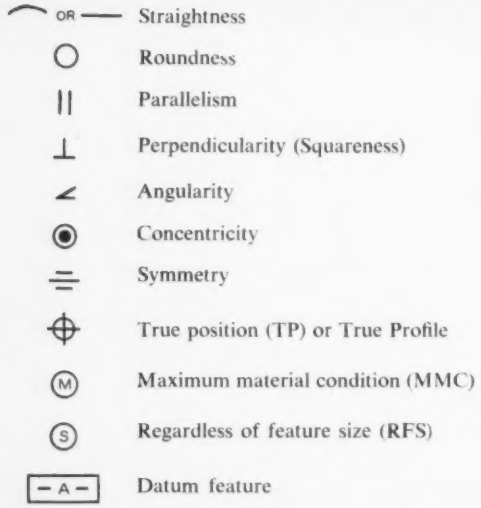


Figure 5—*Symbols recommended for future adoption.*

Figure 5 illustrates the symbols as adopted by the conference.

The dual symbols for "straightness or flatness" resulted from the U.S. Military's contention that the curved line had been used by them since 1953 and could be relinquished only with great difficulty. UK and Canada in turn favored the straight line on the ground that it was the basic element of the other symbols and was favored at present in ISO/TC 10. Incidentally, TC 10 proposed the curved line for "accuracy of profile." The matter was resolved by adopting both.

In addition, the symbols for "maximum material condition" and for "regardless of feature size" were accepted for exclusive use in the feature control symbol block. In notes, the abbreviations MMC and RFS will be used. The symbol for true position can be used to denote true position both in the symbol block and adjacent to true position dimensions.

The present U.S. military system, outlined in the article by S. C. Miller and beginning on page 333, was modified in several respects by the conference, one to conform with the proposed ISO system (the order of listing in the symbol block), the other at variance with the ISO proposal (separation of items by vertical bars).

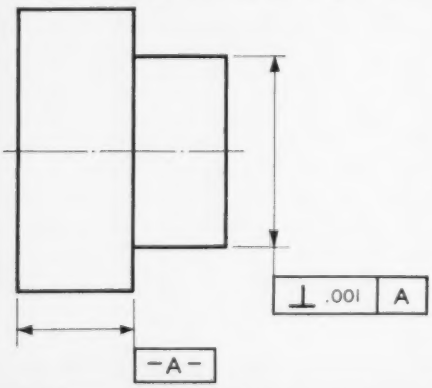
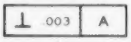


Figure 6—*Placement of datum feature symbol and feature control symbol block.*

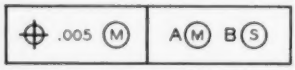
The conference agreed to recommend the following principles:

- Use a feature control symbol block listing information in this order: symbol, tolerance or allowable variation, datum. Vertical dividing bars to be used wherever needed for clarity but always to separate tolerance from datum:



- Use the datum feature symbol when applied to a surface but omit the dashes when used in the feature control symbol block.
- Place the datum feature symbol as a flag on the extension line from the surface involved and the feature control symbol block on an extension of the dimension line for the toleranced feature, both as in Figure 6.

As an example of the shorthand involved in a fairly complex situation, the following is cited as the symbology that would be used to replace the note appearing in Figure 4 on page 323.



Note in this instance that subsitution of the symbol would be entirely possible right now, if desired, since the diametral concept of positional tolerancing is used. Such would not have been the case had the USA note used the radial concept. Since both concepts are recognized in American Standard Y14.5-1957 and will probably remain for some time, the American delegation could only assure the conference that when symbols are adopted in the USA, the symbol for true position (see Figure 5) will represent the diametral concept only.

The Canadians announced that they would move for immediate inclusion of the symbol system in the pending revision of their national standard. Our military services are likely to do likewise in revising MIL-STD-8A, but will probably continue it on the optional basis. Changes in the American and British Standards cannot be forecast but appear almost inevitable. American Standard Y14.5-1957 changes will have to await a change in attitude of those now favoring the radial concept. The UK delegation will probably first wish to sound out the ISO members on the proposed changes in symbols and then move as quickly as possible toward adoption of the system in British Standard 308.

This article cannot end without special tribute to Professor R. P. Hoelscher, leader of the USA delegation and chairman of ASA Sectional Committee Y14, for the restrained perseverance and leadership he has exercised over the last nine years in keeping the objectives of ABC unification ever before the ASA committee in its development of the American Drafting Standards Manual. Without this, the accomplishments at Toronto would not have been possible; the differences would have been too serious and numerous to resolve in the manner proposed. As a consequence, Professor Hoelscher received the ready and competent cooperation of all American delegates in presenting American viewpoints and weighing the counter proposals of the smaller but extremely competent British and Canadian delegations.

The following articles analyzing the present drafting practices were prepared by members of the USA delegation in advance of the ABC conference for the purpose of clarifying the issues to be discussed at the meeting.

Areas of Agreement and Disagreement in the Drawing Standards of the United States, Great Britain, and Canada

by **Leon DeMause** and **R. P. Trowbridge**

General. It was found that the three countries' standards are in agreement on principle on a number of points but do not necessarily concur on method of implementation.

Drawing Sizes. There is general agreement on drawing sizes between the Canadian and American Standards based on increments of 8½ x 11 or 9 x 12 in. However, the preferred British Standard increments are based on arithmetical progression in steps of 5 inches, e.g., 10 x 15, 15 x 20, 20 x 30, 30 x 40, and 40 x 60. Additional odd sheet sizes are listed in the British Standard, but are not necessarily considered preferred.

Formats. The Canadian and American Standards agree on a common format, but the British illustrate several different formats.

Line Conventions. Line work is in agreement between the three countries, except for differences in cutting plane and phantom lines (false views), center line practices, and variety of line widths recognized.

Projections. Although the British still recognize first angle projection to accommodate past practice, there is agreement between the three countries on use of third-angle projection in the future.

Sections. There is general agreement between the three standards, except for minor details.

Screw Threads. Slight differences in screw thread conventions are found in the three standards. These occur in representation of simplified screw threads and in representing the section lining in the sectioning of threaded parts.

Dimensioning. Methods of dimensioning, conventions covering center lines, dimension lines, extension lines, and leaders are similar in the three standards. However, there is some difference in use of dots or of arrows in the dimension line as terminal points of leader lines to indicate surfaces, and in use of parenthesis or the abbreviation "REF" to represent the dimensions known to the British as "auxiliary" and to the Americans and Canadians as "reference."

Form Tolerancing. There is agreement on interpretation in the three standards but variation in notes and emphasis. All three standards agree that where tolerances of form are not specified on a part drawing, the drawing should be interpreted to require perfect form at maximum material condition and to permit errors of form, provided each feature is within its specified limits of size and does not cross the profile established by the maximum material condition. The British and Canadian standards emphasize this requirement in critical applications by specification of zero form tolerance at maximum material condition on the drawing. Specification of zero tolerance is new to American practice and was purposely omitted from the American Standard for fear rejection by American industry would be prejudicial to the standard.

All three standards agree that where form tolerance is expressed without reference to maximum material condition, it shall apply regardless of feature size; and where the abbreviation MMC or words "maximum material condition" appear in the note, additional form tolerance is permitted as the size departs from maximum material.

The American and Canadian standards favor longhand notes, whereas the British Standard makes use of a number of abbreviations in specifying form tolerances. Typical notes are as follows:

American	British	Canadian
STRAIGHT WITHIN .003 TOTAL	STR TOL .003 DIA	STRAIGHT WITHIN .003
FLAT WITHIN .003 TOTAL	FLAT TOL .003 WIDE	FLAT WITHIN .003
PARALLEL TO A WITHIN .005 TOTAL	PAR TOL .003 WIDE DATUM-FACE A	PARALLEL TO FACE A WITHIN .003
SQUARE WITH A WITHIN .003 TOTAL	SQ TOL .003 WIDE DATUM-FACE A	SQUARE WITH FACE A WITHIN .003

For squareness, the British also apply the word "DIAMETER" to the tolerance zone if tolerance zone is cylindrical. Because of past difficulties with interpretation of "WITHIN," the Canadian Standard might well convey the sense of "total zone" in the note.

For concentricity, Americans and Canadians employ the convention of indicator movement call-out whereas the British express concentricity as a zone diameter. The concept of total or full indicated reading is well recognized by all engineers, draftsmen, and inspectors. On this point an attempt should be made to obtain agreement between the three countries on a single convention for specifying total indicated movement, e.g., FIR, TIR, and FIM.

For roundness specification, typical notes are as follows:

American	British and Canadian
ROUND WITHIN .001 ON DIA	MAX OVALITY .001
ROUND WITHIN .0005 ON R	

Interpretations in the three standards are exactly the

same in that the surfaces so described must lie within concentric circles, radii or diameters of which differ as indicated. British and Canadian Standards also include pertinent information on gaging roundness.

For tolerance of profiles, all three standards employ untoleranced contour dimensions to which profile tolerance zones are applied as indicated on the drawing. The British and Canadian Standards identify the contour dimensions by use of the abbreviation TP (true profile) whereas the American Standard recommends identification of the true profile dimensions by supplemental note. In the British and Canadian Standards, the abbreviation TP also denotes true positioning.

True Positioning. The three standards agree in principle on interpretation of true position dimensioning with the following typical variations in specification notes:

American	British	Canadian
XX DIA HOLE LOCATED WITHIN .010R OF TRUE POSITION	HOLE XX DIA POSN TOL .020 DIA	XX DIA LOCATE WITHIN .020 DIA
XX DIA HOLE LOCATED AT TRUE POSITION WITHIN .020 DIA		

In the case of the American specification, true position dimensions are not labeled but rely on the term "true position" in the local note to identify the true position dimensions. In the British and Canadian standards, true position dimensions are identified by the abbreviation TP. It is the thought of the Americans that repetition of the abbreviation TP is inefficient when identification of the true position dimensions can be accomplished by the single note. All three standards agree that information must be included on the drawing to indicate that true position dimensions are not subject to a general tolerance.

The American Standard allows expression of true position tolerances as a deviation (radius) or as a total tolerance (dia or wide). It was felt essential to include both methods of identification in order to document existing American practice and concepts. This is particularly true of the concept employing the radius inasmuch as many American engineers envision the tolerance zone as deviation in all directions from the single true position location.

Whereas the British Standard recognizes application of the maximum material concept to position tolerancing by only one method—use of the abbreviation MMC in the true positioning note—the American and Canadian Standards allow specification of the maximum material concept by:

1. A general note on the drawing
2. A supplemental specification referred on the drawing
3. Use of the abbreviation MMC

It is the American position that well over 90 percent of all positioning problems will allow an increase of positional tolerance as feature size departs from maximum material condition. It is therefore thought that emphasis need not be placed in the drawing note if suitable coverage is given in a general note or auxiliary specification.

The Americans do believe, however, that where additional positional tolerance is not allowable as the part deviates toward minimum material condition, the case is special and deserves special call-out. Accordingly, the supplemental expression "REGARDLESS OF FEATURE SIZE" is added to the true position note. The Canadian Standard recommends this supplement where emphasis is required. The British Standard, however, assumes that where MMC is not included in the note, position will be held regardless of feature size. This difference in practice of the three countries could lead to misinterpretation.

Abbreviations. Abbreviations for use on drawings are not within the scope of ASA Y14 activity, but are apparently a responsibility of the British and Canadian Drafting Standards Committee. The British and Canadian Drafting Standards employ a symbol to mean diameter. The only diameter abbreviation recognized in the American Standard is DIA. The abbreviation MMC which appears in all three standards is not in the current American Standard for Abbreviations.

In the United States the responsibility for abbreviations used on drawings falls to ASA Sectional Committee Y1. The current American Standard Z32.13-1950 is now being reviewed by Committee Y1 for eventual revision. Comparison of the Z32.13 standard with abbreviations which appear in the British and Canadian Drafting Standards discloses a number of differences between abbreviations in the three countries. It would be advisable to initiate correspondence between the Y1 Committee and responsible British and Canadian committees for the purpose of unifying abbreviations or establishing cross reference lists.

Terminology. The terminology in the three standards varies considerably, especially with regard to item and feature names. A list of equivalent terms would be very helpful in cases where engineering information and drawings are exchanged between the three countries. Such a glossary does not fall within the scope of Y14 activity but should probably be developed by a group representing a wide cross section of mechanical engineering. In the United States, such a group could be formed under the auspices of the ASA Mechanical Standards Board.

Surface Irregularities. In the American Drafting Standard, coverage of surface qualities and the use of surface symbols on drawings is given by reference to the American Standard on Surface Roughness, Waviness, and Lay, B46.1-1955. The British and Canadian Drafting Standards contain rather detailed coverage of surface symbols. Both British and Canadian Standards use the symbols in two ways: (1) to depict surface quality and

(2) to depict the requirement for a machining operation. This latter application is not embraced in the American Standard. In the B46 standard it is understood that the surface symbol may be applied to cast, rolled, or forged surfaces as well as to machined and abraded surfaces of all sorts. The British Standard BS 1134-1950 also recognizes that grading of surface texture may be applied to surfaces other than machined surfaces. It would appear, therefore, that it is a misuse of the surface symbol to indicate machining operations. Inasmuch as surface roughness falls within the scope of the B46 activity, it would be advisable for the three countries to establish the exact limits of usage for the surface symbol and machining symbols.

True Position on Drawings

by **N. E. Brown** and **Joseph Stannard**

Background

One of the earliest forms of true position dimensioning used by American draftsmen was one in which the tolerancing of the part was given by describing the round-pin position gage for inspection of the part. That this early form made direct reference to the gage was no accident. In America it was the gage-maker and the gage-designer (frequently the same man) who understood and used true position tolerancing long before it was actually specified on drawings. This is to say that although the draftsman was specifying a square positional tolerance zone, by means of directly toleranced coordinates, the gage man was usually building gages based on a round tolerance zone.

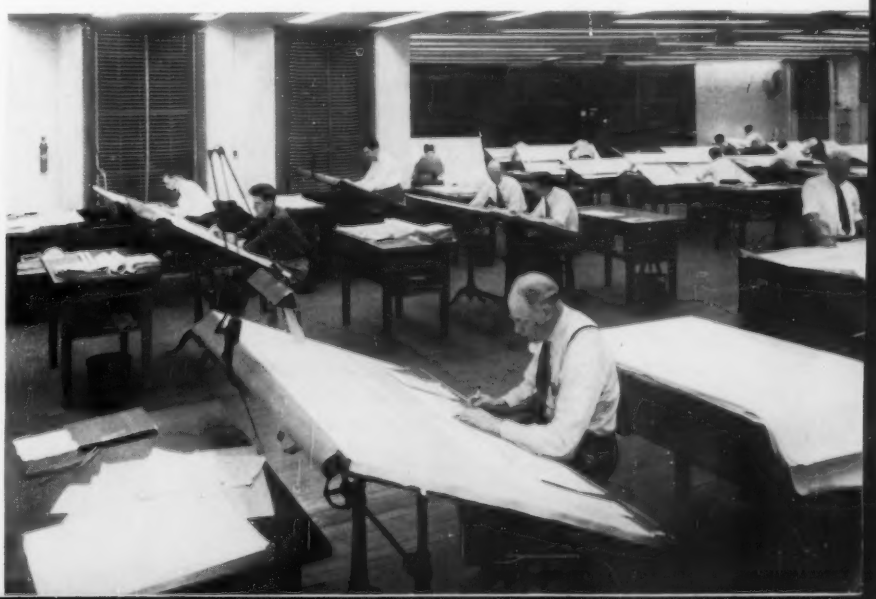
He was using true position tolerancing before it was given to him. It may have been due to his insight into bolt hole misalignment problems, or to his gage-maker's intuition, but for many years he made gages with round pins while a more strict, if less commonsense, interpretation of part drawings would have required a more complicated gaging method.

In time, the draftsman saw the good sense in the gage-maker's practice and started to support it on his drawings. One of the earliest forms of this support was a drawing note which read as follows.

.250-.260 DIA 4 HOLES MUST FREELY ADMIT
NOMINALLY LOCATED GAGE PINS
.010 UNDER MIN HOLE SIZE

Later, due to a trend away from the mention of gages or tools on part drawings, this earliest form was replaced by other forms of true position tolerancing, but something was to be lost in the process. Of these later forms, one was given in an industry standard while a different one appeared as a military standard. The industry standard used basic locating dimensions and the note form "X HOLES LOCATED WITHIN .XXX OF TRUE POSITION," thereby giving a radial deviation from true position and resulting in a cylindrical zone of tolerance. The military standard defined true position tolerance substantially the same as had the industry standard, as a radial deviation, but recommended that this tolerance be doubled and expressed as a diametral value, thereby giving directly the size of the cylindrical zone of tolerance. This was to be expressed by a symbol, which meant "feature must be located within .010 in. Dia of true position." [This is the same as the True Position Symbol, Figure 2, page 334.]

With both of these methods something had been lost, something inherent in that earlier form which had made reference to a gage. The "something" was the implicit



The drafting department *of the Taft-Peirce Company, where Mr Brown is chief designing engineer. He is also chairman of the Subcommittee on Dimensioning and Notes of Sectional Committee Y14, Drawings and Drafting Practice.*

recognition in the older form that positional tolerances were based on and were to be inspected on the maximum material principle. Two years ago, a new Aeronautical and Automotive industrial standard was published, which restored to the drawing the maximum material concept for true position tolerancing.

The Current American Standard

The American Standard ASA Y14.5-1957, while embodying much of the current American approach to true position tolerancing, also agrees to a large measure with the British and Canadian Standards, BS 308 and CSA 78.1. However, there are certain points in the American Standard which are not common to the British and Canadian Standards.

A review of some of these points, as well as the reasons why they are supported in the American Standard, are given in the following:

(1) *Spelled-out Form of Tolerance Notes*: The three standards (British, Canadian, and American) use different forms for expressing a given positional tolerance.

The following examples show these forms, and result in a common tolerance control:

(a) From the British Standard:

4 HOLES .XXX-.XXX
POSN TOL .010 DIA (MMC)

(b) From the Canadian Standard:

4 HOLES .XXX-.XXX
LOCATE WITHIN .010 DIA (MMC)

(c) From the American Standard:

(I)	or	(II)
.XXX-.XXX DIA 4 HOLES LOCATED WITHIN .005R OF TRUE POSITION AT MMC		.XXX-.XXX DIA 4 HOLES LOCATED AT TRUE POSITION WITHIN .010 DIA AT MMC

The somewhat longer forms in the American Standard reflect a conservatism about the free use of symbols on drawings. That is, in the event of a suddenly accelerated industrial program, with the new personnel and new vendors that would follow, the American feeling is that drawings should require a minimum of decoding.

(2) *Two Forms of Tolerance Note*: The American Standard gives two optional forms expressing a given positional tolerance. See above examples (c) (I) and (II). Example (I) is substantially the form which has been used by a large segment of industry for the past several years. Many engineers feel that it is less subject to misinterpretation than is its optional form, example (II).

The form given in example (II) has not yet had a great deal of use in the United States, although favored by a substantial number of manufacturers. Each of these variants, (I) and (II), has its strong supporters. Therefore, an American Standard has been adopted which permits a choice of the two forms. It was further resolved that in order to differentiate between the two forms, the abbreviation "R" should be introduced into form (I).

(3) *The Special Condition Where Maximum Material Condition Does Not Apply—To be Specified Rather Than Implied*: For this special case the American Standard gives the phrase REGARDLESS OF HOLE SIZE to be added to the true position notes given in the examples under (I) and (II) above. This is to cover those requirements which are so exacting that the feature must be just as precisely located whether it is at minimum, maximum, or at some intermediate limit of size. The manufacture and inspection to this requirement is admittedly more complex. The addition of this phrase was prompted by the feeling that, where requirements are thus exacting, it is safer to flag each such instance than to risk a maximum-material misinterpretation due to oversight.

(4) *Basic Locating Dimensions*: The American Standard states, "the true position of a feature is established by untoleranced dimensions. Information must be included specifying that the general tolerances do not apply to the dimensions establishing the true position." This requirement insures that affected dimensions will be identified as basic values, subject only to the tolerances given in the true position notes. This may be done by local or general notes. In the same manner, and for the same reason, the British and Canadian Standards use the symbol "TP" signifying "true position." However, they also use this term to signify "true profile." The use of the term "TP" on American drawings would entail educational effort not only to explain the intended "true position" use of the symbol but, ultimately, to explain the distinction between the symbol "TP" (true position) and the symbol "TP" (true profile).

Future Developments

Eventually the American Standard might well expand its true position tolerance section to cope with some of the day-to-day problems which require answers, such as the following:

(a) Long, small-diameter drilled holes. Where such holes must be accurately located at one end, but can be permitted a greater deviation at the other end to accommodate drill "wander," the drawing should so specify.

(b) Clarification on whether the true position tolerance for a threaded hole applies only to the thread pitch diameter or to the major and minor diameters as well.

(c) Clarification on whether the true position tolerance applied to a counterbored bolt hole applies also to the counterbore.

(d) Further exploration of detailed text and interpretation of locating patterns of holes from datum.

Conclusion

It seems quite safe to say that agreement between subject portions of the American, British, and Canadian Standards, even today, seems so close that an English-speaking engineer would have little trouble in clearly understanding drawings made to any of the three standards.

Maximum Material Condition on Drawings

by **P. G. Belitsos**

Introduction

One of the most important and significant advances made in the American Standard on Dimensioning (ASA Y14.5-1957) is recognition of the relationship of geometric and positional tolerances to the size tolerances of various features of component parts. For the first time this relationship is acknowledged in a standard at the American national level and methods have been established for specifying it on engineering drawings *so that there will be no question of design intent.* In fact, to emphasize the newness of this maximum material condition concept, it has never before been recognized in any industrial standard on engineering drawing practice published in the United States.

Considerations in Establishing American Practice

The principles which relate the geometric and positional tolerances were established only after careful consideration was given to the following:

(a) The American Standard would be based on practices which were widely used and which were proven to be technically sound.

(b) New methods of expressing design requirements would be introduced only when there were no existing methods or when new methods had been proven to be better than existing methods.

(c) Requirements of a repetitive nature would be minimized or eliminated to reduce drafting and engineering time in preparing drawings.

(d) Consistency would be maintained in the expressions used for specifying geometric and positional tolerance requirements, but not to the exclusion of widely used and easily understood established practices.

In the following discussion, it will be demonstrated how these considerations dictated the methods of expression adopted in the American Standard.

Maximum Material Condition of Size

Before the principles established in American Standard Y14.5-1957 are analyzed in detail, it is first necessary to develop the definition of the term "Maximum Material Condition" of size. This term is comparatively new in engineering design terminology and will receive wider use from now on.

All design features of component parts can be classified as external or internal features. See Figures 1 and 2.

In addition, the physical size of each feature is defined by the use of tolerances which can be expressed by any one of three methods; (1) bilateral, (2) unilateral, and (3) limit. See Figures 1 and 2.

In each case the high and low permissible limits of size are established. *A feature is at its maximum material condition (MMC) of size when it contains the maximum amount of material.* For example, in Figure 1 the external feature such as the rabbet dia. (3.000-3.005) is at its maximum material condition when it is at its maximum size limit. On the other hand, the internal feature, such as the through hole in Figure 2 (1.000-1.002), is at its maximum material condition when it is at its minimum size limit.

It is a well recognized principle of good design that limits of size for mating parts are established on the basis of that condition of assembly at which the clearance is at its minimum. When the engineering designer has established the size limits of the mating parts that determine the minimum clearance, he has in fact established the maximum material condition of size for each of the mating parts. Since this is the most critical condition of the assembly, it is essential that the specification of the engineering requirements which control this condition be clearly and accurately stated.

It is also essential that the designer consider not only the limits of size but also the effect of permissible variations in the geometric form and position of the mating

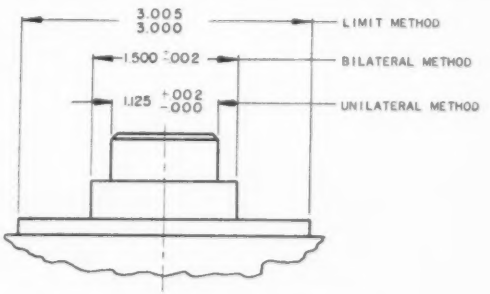


Figure 1—*External Features*

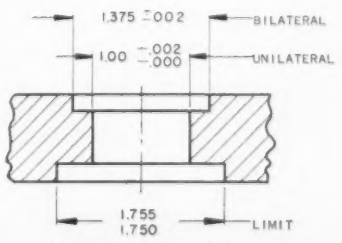


Figure 2—*Internal Features*

NOTE: American Standard Y14.5-1957, Dimensioning and Notes, Section 5 of the American Drafting Standards Manual, Y14, has been published by The American Society of Mechanical Engineers, one of the sponsors. The American Society for Engineering Education is co-sponsor. Copies of the standard are available from ASA and ASME at $2.00.

features. When a feature has variations of form or position its effective size is altered; i.e., the effective size of an internal feature is reduced and the effective size of an external feature is increased. In Figure 3A the size tolerance for this external diameter is .99-1.00. However, in Figure 3B, the combination of the straightness tolerance of .005 and the size tolerance results in an effective size of 1.005 dia. It follows then that the tightest condition of assembly occurs when the mating features are at their maximum material condition of size and the maximum variations permitted by the specified geometric or positional tolerances are present.

Positional Tolerancing

In locating a single feature such as a hole, slot, etc, or a group of features, it has been the custom on American drawings to omit specification of any relationship between the positional tolerance and the size tolerance. There has, however, been an unwritten understanding among engineering, manufacturing, and inspection personnel that unless otherwise specified the positional tolerance would apply only at the maximum material condition of size. This is evidenced by the fixed-type positional gages which have long been in wide use where production of any sizable quantity is involved.

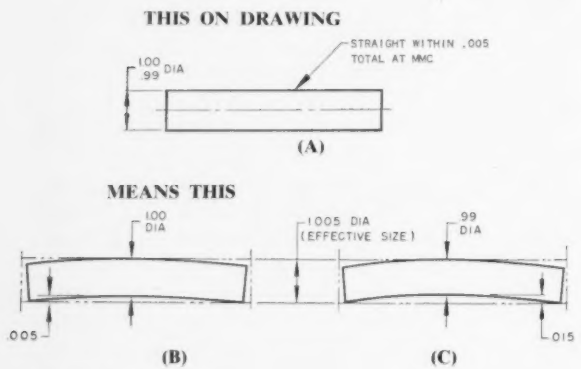


Figure 3—*Old Practice*

For example, a gage made for the group of holes shown in Figure 4 would be designed as shown in Figure 6. In the development of the new American Standard it was agreed after much debate that this unwritten understanding was not sufficient, particularly where legal interpretation might be involved. Upon careful examination of all the facts, agreement was reached on the following:

(1) All mechanical designs involving mating parts, except for a few unusual cases, require that the positional tolerance for various features be maintained only at the maximum material condition of size. As the individual feature departs from the maximum material condition, an additional positional tolerance is available and acceptable. It followed, therefore, that the long standing convention was established on the basis that unless otherwise specified, positional tolerances would apply at the maximum material conditions only.

(2) However, since there might be some question, particularly if a general tolerance block is used on the drawing, it was decided to state this directly using one of three methods: a) by adding the abbreviation MMC to each applicable positional specification; or b) by the use of a general note; or c) by suitable coverage in a specification which is referenced on the drawing.

The following is a brief discussion of each of these methods:

Use of the Abbreviation MMC — The abbreviation MMC is new in the United States and has not yet been

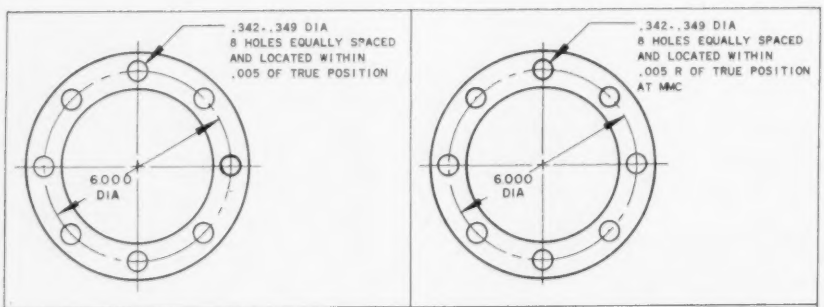


Figure 4—*Old Practice*

Figure 5—*New Practice*

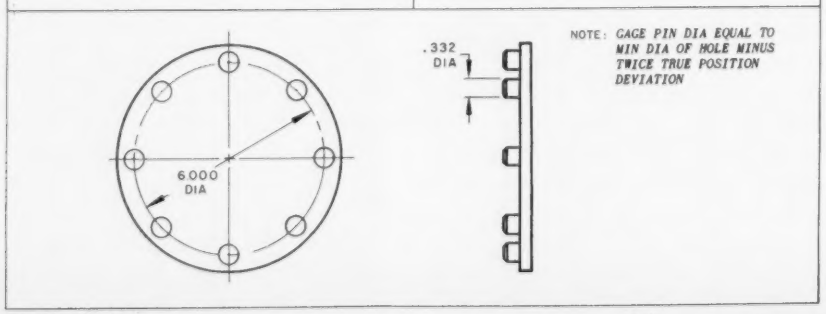


Figure 6—*Gage*

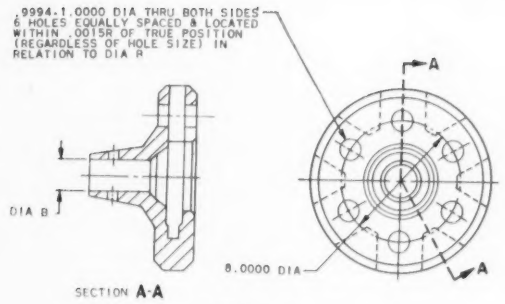


Figure 7

recognized in any American Standard on abbreviations. It can be used as shown in Figure 5. It should be noted that the positional requirement in Figure 4 and Figure 5 is the same and the positional gage shown in Figure 6 would be applicable to both. Since MMC is not a widely used abbreviation, there must be an explanation on the drawing or on a supplementary specification to explain its meaning and significance. It will probably take several years before this abbreviation is sufficiently established and widely understood to eliminate the need of this stated explanation.

Since positional tolerances apply to MMC in all but a few exceptional designs, there are many who doubt that it is practical to repeat this requirement each time that it applies. It is therefore expected that most companies will prefer the use of one of the latter two methods of specifying this requirement. This will hold true particularly on drawings where there are several patterns of features such as holes and will eliminate the repetitive use of MMC throughout the face of the drawing with savings in drafting and engineering time.

Use of a General Note — A note such as "UNLESS OTHERWISE SPECIFIED POSITIONAL TOLERANCES APPLY AT MAXIMUM MATERIAL CONDITION" can be used, particularly if there are several positional tolerance notes used on one drawing.

Coverage in a Supplementary Specification—In recent years many companies have found it necessary to reference a supplementary specification on drawings which provides coverage on repetitive detail information that is impractical to include on the face of each engineering drawing. This is an ideal place to include coverage on the MMC requirement, eliminating the need for using the general note or for repeating the abbreviation in several locations on the face of each individual drawing.

Positional Tolerances Regardless of Feature Size

There are infrequent designs where the stated positional tolerance must be held regardless of whether the feature is at maximum material size, minimum material size, or anywhere in between. Where this restricted positional control is required, the phrase "REGARDLESS OF FEATURE SIZE" is added to the true position note. See Figure 7.

Since this is a special design requirement that results in more complicated and expensive positional gaging, the practice was established in the American Standard to specify clearly and directly this requirement on the drawing by the use of this additional brief phrase. There were some who felt that unless a positional tolerance was specified to apply only at MMC, it must follow that it applied at any condition of size. After much study of this point it was agreed that this special requirement is so unusual in mechanical design that it is essential to state it so that it will not be overlooked by manufacturing and inspection and result in production of scrap.

The above principles were established in the American Standard only after very serious and careful deliberation. It was agreed that to eliminate any possible misinterpretation and to minimize production of scrap *it is necessary to state in every case whether the relationship between the positional tolerance and the size tolerance applies at MMC or REGARDLESS OF FEATURE SIZE.*

Geometric Tolerancing

In specifying the required geometric form tolerance it has been the custom on American drawings not to specify any relationship between the form tolerance and the size tolerance. In this case, there has been an unwritten understanding among engineering, manufacturing, and inspection personnel that the form tolerance would apply at any size of the feature. This was evidenced by the fact that the size was first inspected and accepted, and then the form tolerance was inspected and accepted separately.

Since this interpretation was firmly established by convention it was decided that there was no need to include any further notations on the drawing. The American Standard therefore confirmed the practice that *when a form tolerance is specified without any further qualification, it is to apply regardless of the actual finished sizes of the features.* See Figures 8, 9, 10.

At this point we encounter what appears on the surface to be an inconsistency in the American Standard. It was noted in the paragraph on positional tolerancing that when the positional tolerance is required to apply regardless of the actual size of the feature it is necessary to specify this as part of the tolerance note. This was justified on the basis of very limited application and the need of emphasizing this exceptional requirement for positional tolerances. On the other hand, for geometric form tolerances this requirement is the rule rather than the exception and therefore it becomes impractical and unnecessary to repeat this requirement. It has already been established by wide usage and general agreement in industry.

As in the case of positional tolerancing, there are designs where the specified form tolerance need only be maintained at maximum material condition of size. See

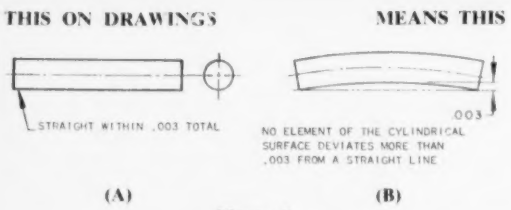


Figure 8

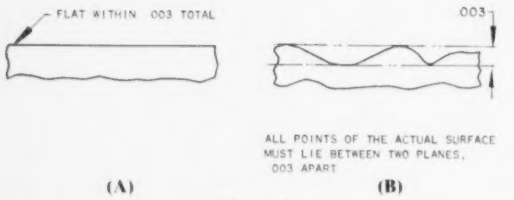


Figure 9

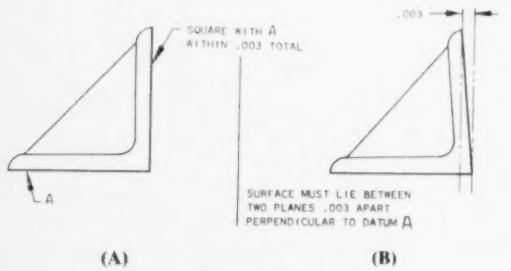


Figure 10

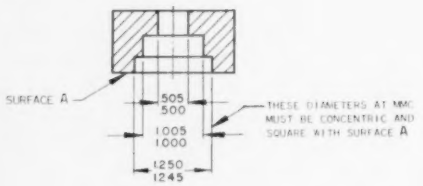


Figure 11

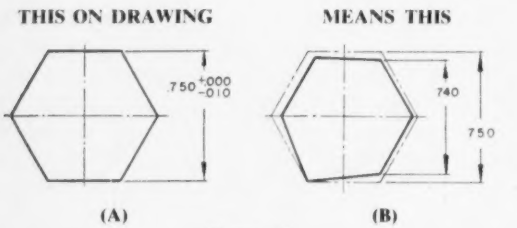


Figure 12

Figure 3B. It was therefore necessary to establish the American practice on how to specify that the form tolerance could be allowed to vary with the size tolerance. See Figure 3C. To indicate this on the drawing, the American Standard requires that drawing notes specify that the form tolerances apply "AT MMC." See Figure 3A. Here again until the abbreviation MMC is widely used and understood, there will be many who will prefer to spell it out as a requirement to be met "AT MAXIMUM MATERIAL CONDITION." It is well to point out that in this case the American Standard does not mention the possible use of a general note or coverage in a supplementary specification because of the very limited application of this type of requirement in form tolerancing.

The only remaining principle relating geometric form tolerances to size tolerances that is covered by the American Standard is one that has limited application. It establishes the type of notation to be used when variations of form are to be contained within the maximum material condition of size. Where used, this type of design requirement specifies that the *features must be perfect in form at maximum material condition of size, but variations of form are permissible as the size of the feature departs from maximum.* Figure 11 illustrates this principle where a hole and two-step counterbore must be exactly concentric and all three exactly square with a datum surface, when these features are at MMC. Consideration was given to the advisability of stating this requirement in a form such as "CONC & SQ TOL ZERO AT MMC." It was agreed that the use of the expression "zero tolerance" is unknown to American practice and would certainly result in drastic reaction from manufacturing and inspection personnel. On this basis the method illustrated in Figure 11 was established.

Significance of Size Tolerance Without Form Tolerance

The American Standard establishes a final important principle related to the form control that is expected when the size limits of the feature are given without any specified tolerance of geometric form.

The principle is that *when tolerances of form are not specified it is interpreted that variations of form are permitted provided they are within the specified limits of size and do not cross the profile established by the maximum material condition.* Figure 12 illustrates the meaning of this principle applied to a hexagonal shape. If the hexagon is at its maximum material condition of size, it should be perfect in form. However, as its size departs from maximum, its geometric form can vary from a true hexagon.

It is to be noted that this interpretation is based on results expected from general manufacturing practice and equipment in addition to ordinary gaging practice. Where it is an important design requirement that the geometric form of a feature must be true at MMC, then it is necessary to specify this as shown in the preceding paragraphs.

Geometric Forms

by **Stuart C. Miller**

THIS subject may be subdivided into two parts, (1) the need for symbols to define geometrical and positional tolerancing requirements, and (2) the desirability of standardizing such symbols.

History

C. A. Gladman, formerly of the British National Physical Laboratory, proposed a system of symbols in a paper written in 1944. These symbols related to position, concentricity, and symmetry. A different symbol was provided for each of the following three types of features: (1) universally interchangeable features, (2) locally interchangeable features, and (3) grouped features to be jig drilled. Emphasis was placed on groups and the same letter was used to designate all features in a group. Only one symbol was used for geometrical and positional tolerancing of universally interchangeable features, namely, two concentric circles enclosing the group letter and a whole numeral designating the tolerance in thousandths. Datum features were designated by two small circles on opposite sides of the outer circle of the normal symbol. Thus, each feature marked with such a symbol was required to be in correct geometrical position or alternatively concentric, or both, and alternatively, symmetrical with every other feature in the group carrying the same group letter within the stated tolerance. Parallelism or squareness (perpendicularity) requirements were considered as they affected geometrical position; no separate symbols were used for these characteristics; and the tolerance for geometrical position was interpreted as including a limitation on departures from perpendicularity or parallelism, or both. (Figure 1.)

In August 1945, U.S. Army Ordnance devised and published a manual in which was introduced a system of symbols for geometrical and positional tolerancing. Included were symbols for the following: datum surface, concentricity, perpendicularity, parallelism, symmetry and position. The symbols for datum surface, concentricity, perpendicularity and parallelism are the same as those shown today in MIL-STD-8. The symbol for symmetry became lost for some unknown reason and was not incorporated in MIL-STD-8. U.S. Army Ordnance stated that their positional tolerance system was based upon ideas first proposed by Mr Gladman. The position tolerance symbol in this first draft consisted only of the tolerance in a rectangle, sometimes with the addition of a letter specifying the datum. Between 1945 and 1949, U.S. Army Ordnance expanded their system of symbols. The original symbols were utilized in a subdivision entitled "Independent Locational Tolerance Symbols." Independent locational tolerances were defined as those that applied regardless of feature size; in other words, tolerances that were not affected by departures from maximum material condition. The concept of "Dependent or Functional Locational Tolerance Symbols" was introduced and the symbol consisting of the rectangle enclosing the datum letter and the functional tolerance was used under this concept. U.S. Army Ordnance defined a dependent tolerance as a tolerance that is dependent upon, and varies with, the actual size to which a feature is produced. However, in addition to embracing the MMC concept, the dependent tolerance was described as limiting the total functional variation, the geometry of the part determining whether functional concentricity, perpendicularity, parallelism, or symmetry was the requirement.

In 1946, the SAE Aeronautical Drafting Manual suggested a scheme of symbolized notes in which it was proposed that the following general notes be placed on drawings:

> "A surfaces must be concentric, flat, square and true (as applicable) to each other within .XXX full indicator reading unless otherwise specified."
>
> "Z diameters must be circular within .XXX, parallel within .XXX, and straight within .XXX."

It was intended that all such surfaces on the drawing of a part be marked with the letters A or Z. This scheme did not provide for separate groups of features or for different datum surfaces. Subsequently, the SAE Aeronautical Drafting Manual was revised to provide methods for specifying geometrical functional require-

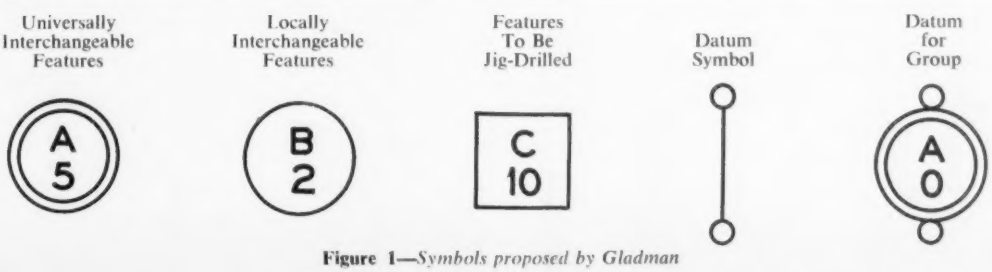


Figure 1—*Symbols proposed by Gladman*

ments for multiple surfaces, each group of features being segregated by relationship to a common axis. One of the new notes provided was as follows:

> "A surfaces constructed around or at right angles to a common axis when part is mounted on surface (or surfaces) X must be within full indicator reading specified."

The draft of British Standard 308 dated 1949 provided a system of symbols (actually, lettered references) for the geometrical characteristics of flatness, straightness, angularity, parallelism, squareness, position, concentricity and symmetry. The same symbol was used for all of these characteristics, consisting of a rectangle containing the group letter and the tolerance. Distinctive letters were assigned not only to each group, but also to each geometrical characteristic pertaining to the group, and such meanings of all letters pertaining to a particular part were tabulated.

A meeting to discuss unification of drawing practice was held in London in April 1949 between American and Canadian Armed Service representatives and members of the British Inter-Services Committee. Originally, the British representatives were of the opinion that the same symbol should be used for position, concentricity, and symmetry, namely, a dot. Agreement was reached on symbols for flatness, angularity, squareness, and parallelism. Such symbols for flatness, angularity, squareness, and parallelism were identical with those now shown in MIL-STD-8. Later, during the same meeting, the British stated that they had reconsidered and had decided that separate symbols should be used for position, concentricity, and symmetry.

MIL-STD-8 as issued in December 1949 did not contain any information on geometrical or positional tolerancing. However, a proposed draft of a section of this standard establishing a system of symbols was circulated in September 1951 for comment. Although U.S. Army Ordnance objected because their system of Dependent or Functional Tolerancing was not included, the present symbols were issued in MIL-STD-8A on 5 June 1953. The standard makes the use of symbols optional, but requires that if symbols are used on drawings prepared for the Department of Defense they shall be in accordance with those shown in the standard. No symbols are provided for symmetry or roundness, also no mention is made of the effect of the maximum material condition concept upon positional and geometrical tolerancing. The illustrations of the use of true position tolerancing and the interpretation thereof are inadequate and require amplification. However, a suitable system of symbols has been provided for datum features, flatness, straightness, angularity, perpendicularity, parallelism, concentricity, and true position. The majority of these symbols look like their corresponding geometrical characteristic so that they are readily recognized. As previously stated, several of the MIL-STD-8A symbols agree with the original U.S. Army Ordnance symbols of 1945.

Geometrical symbols were omitted from British Standard 308 as issued in 1953. However, the illustrations show the positional and geometrical tolerance notes either in abbreviated or tabular form. The tabular method in particular saves space as compared with individual complete notes and gives a more orderly appearance to the drawing.

Several companies in the United States have their own systems of symbols for geometrical and positional tolerancing. Despite the mandatory nature of MIL-STD-8A, these individual company symbols have been used on drawings prepared for the Department of Defense.

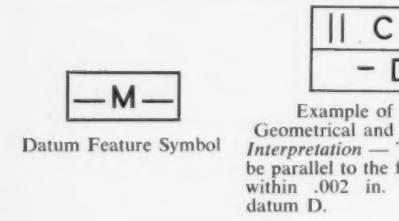


Figure 2—*MIL-STD-8A Symbols*

Advantages of Symbols

Symbols for geometrical forms are an important element in a short-hand method of drafting. They occupy

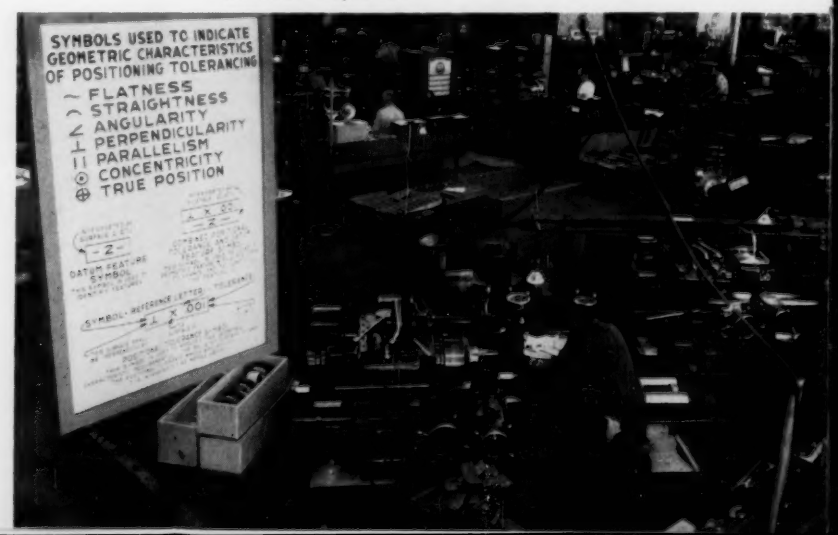


Figure 3—*Poster in contractor's shop helps personnel follow MIL-STD-8 Symbols.*

USA Delegates to ABC Conference, Toronto, Canada

Professor R. P. Hoelscher, University of Illinois; chairman, Sectional Committee Y14, Drawing and Drafting Practice
P. G. Belitsos, General Electric Company
N. E. Brown, Taft-Peirce Company
A. P. Corridon, Ordnance Corps, Department of the Army
Leon DeMause, General Motors Corporation
J. J. Dunn, Office of Assistant Secretary of Defense (Supply and Logistics)
Francis D. Floto, Wright Air Development Center
C. H. Heller, Bell Telephone Laboratories, Inc
E. H. Jones, Bell Telephone Laboratories, Inc
C. L. Miller, Office of Assistant Secretary of Defense (Supply and Logistics)
S. C. Miller, Bureau of Ordnance, Department of the Navy
C. C. Muller, Office of Assistant Secretary of Defense (Supply and Logistics)
Benjamin Orr, Signal Corps, Department of the Army
Professor R. S. Paffenbarger, Ohio State University
Professor C. H. Springer, University of Illinois
Harry Springer, Corps of Engineers
J. Stannard, United Aircraft Corporation
Craig Telfer, Eastman Kodak Company
R. P. Trowbridge, General Motors Corporation
S. H. Watson, Radio Corporation of America
Observers—
Professor Jasper Gerardi, University of Detroit
C. McMahon, Bay State Abrasive Products Company
C. A. Slater, Bendix Aviation Corporation
F. H. Smith, University of Michigan
Staff—
C. E. Hilton, American Standards Association
J. W. McNair, American Standards Association
Frank Philippbar, American Society of Mechanical Engineers—
J. D. Wilding, American Society of Mechanical Engineers
ASA Representative on ABC Steering Committee—
Vice Admiral G. F. Hussey, Jr USN (ret), managing director, American Standards Association

less space than complete notes; hence, they give the drawing a less cluttered appearance than notes. Symbols, once the system has been learned, are applied to drawings in a more uniform manner than notes. Each draftsman tends to word notes in a different way unless copying word-for-word; such differences in wording result in inaccuracy of both expression and interpretation. To anyone familiar with the symbols, a drawing containing symbols can be read more quickly than a drawing containing the same requirements in the form of notes. The eye transmits the message of a familiar symbol instantaneously; a note of several words, or of two or more lines, requires pondering. Symbols are closer kin to the picture on the drawing than are words; the over-all geometrical accuracy required for the part depicted is grasped more quickly by the viewer of the picture and its symbols than by the reader of many notes scattered about the drawing.

Need for Standard Symbols

From the foregoing history it will be seen that many variations in the nature and application of geometrical and positional symbols have been advocated and used. Undoubtedly, the majority of the systems of symbols proposed and in use are capable of correct application and interpretation by draftsmen, machinists, tool and gage designers, and inspectors. However, this result is possible only after a period of indoctrination on the part of all personnel concerned. Indoctrination demands a good document written in simple terms to establish the rules for using the symbols and to state the only permissible interpretation. Indoctrination must be based on only one system of symbols and not on two or more, since the primary objective of symbols should be to clarify drawings. Manufacturers cannot be expected to employ engineers to study the texts or standards defining the different systems in order that they may instruct shop personnel. Even if this instruction were provided, two systems of symbols for geometrical tolerancing in the same shop lead to chaos, not to simplification and clarity. Complete notes are infinitely to be preferred to two systems of symbols, since notes usually are capable of interpretation on the spot without recourse to a reference library.

MIL-STD-8 geometrical and positional tolerancing symbols have been in use in drawings prepared for the Bureau of Ordnance, Navy, for less than two years. As far as is known, all design and manufacturing activities that either have used or have been required to interpret such symbols are pleased with the results.

Figure 3 illustrates a feature of the indoctrination program in a contractor's plant. When symbols first were introduced, classes were held for supervisory and inspection personnel. About an hour was devoted in each class to the general subject of the symbol system. The large symbol boards illustrated by the photograph then were installed in each shop. While the symbol boards do not give a complete explanation, they do help to refresh the memory of personnel who have been given thorough instruction.

Summary

The section of geometrical and positional tolerancing symbols in MIL-STD-8 will be expanded to provide a more complete explanation of such tolerancing, particularly in relation to the MMC concept. It is believed that symbols have advantages over notes, but only if everyone is fully acquainted with the symbols. Such familiarization is possible only if industry and the military in the ABC countries use only one system of symbols. It is recommended that the MIL-STD-8 symbols be adopted and illustrated as an optional method of tolerancing in each of the pertinent national standards.

STANDARDS ENGINEERS SOCIETY

MORE than 300 members of the Standards Engineers Society and guests met during the Sixth Annual Meeting of the Society at the Hotel Commodore, New York, September 23-25. Following the theme of the meeting, Standardization — Economy Through Application, the program offered sessions progressing from management's problems, through techniques for preparation of standards, sources of information, making standards available, cooperation between departments, reliability, government-industry cooperation and cost reduction.

Herbert G. Arlt, Bell Telephone Laboratories, Murray Hill, N. J., president of the Society, opened the meeting. The part played by the standards engineer in the world today is closely related to the survival of the human race, he said. "The increased pace of improvements in medicine and other factors indicates an increase in world population of great magnitude. This increase in population pressures is already creating international tensions of considerable magnitude. The standards engineer can play an important part in relieving such tensions by stimulating and assisting the research, development, and manufacturing engineers in making available larger and larger quantities of properly standardized items at lower and lower costs."

Mr Arlt reported a membership increase during the past year of 18 percent, bringing the total number of members to 634. Ninety percent of the membership is affiliated with the ten local sections in the USA and two sections in Canada. Development of new local sections is underway in seven other areas of the United States and Great Britain, he said.

"A few years ago there was no such category as a standards engineer," Mr Arlt pointed out. "Many engineers were active in standards work but usually spent only a part of their time in such activities. More recently, however, we have seen the development of engineering standards organizations, some of which, particularly in the larger companies, have become quite sizeable and elaborate. The standards engineer is now recognized as a very necessary specialist in engineering. The proof is the increasing development of standardization and use of standards of all kinds at the company, professional society, trade association, national, and international level."

Fellowships were awarded to four men who have made outstanding contributions to standardization (see page 340).

An award was also presented for the best paper dealing with some phase of standardization submitted in the

Charters were presented *to SES sections. Here, Herbert J. Arlt, SES president, presents charter to Max Reimer, chairman of the Metropolitan N. Y. Section.*

Dr John C. Hutton, *principal speaker at the Awards Luncheon, urged USA to prepare for USSR technical competition. Seated are Herbert G. Arlt, SES president, and Richard T. Kropf, vice-president and director of research, Belding-Hemingway Co, Inc, New York, and president, American Society for Testing Materials.*

Society's technical paper contest. Girton Carle, Standards Engineer, Link Aviation Company, Binghamton, N. Y., won the award with his paper "Nebulous Names Make Nuisances."

Speaking on "Exchange of Technology—An Opening in the Iron Curtain," Dr John C. Hutton, Manager, Electrical Engineering Laboratory, General Electric Company, New York, gave his impressions of the technical and economic developments in the USSR. Dr Hutton had been a delegate to the recent meeting of the International Electrotechnical Commission at Moscow. He found the Russian progress in electrical developments impressive, the spirit of workers good, and engineers highly skilled. Great emphasis is placed on education, he said. In the sixth five-year plan covering the period from 1956 through 1960, marked advances in all heavy industry are projected but in only a few cases is the production of consumer goods being accelerated. Dr Hutton believed that the world could expect great economic growth in Russia within the next few years, and urged that the USA be prepared for the USSR to compete on equal terms technically within the next five to ten years.

Seated at the head table during the banquet were heads of the three organizations devoted to standards—the Standards Engineers Society, the National Bureau of Standards, and the American Standards Association.

Vice Admiral G. F. Hussey, Jr, USN (ret), Managing Director of the American Standards Association, and Fellow of the Society, commented on the question frequently asked, "Isn't the Standards Engineers Society in competition with the Company Member Conference of ASA?" The answer is "No," he said. The subjects that appear on the programs of the two organizations are often the same or very nearly the same; but they are approached from different viewpoints. In the CMC the point of view is "What can my company do to improve its standards program?" In SES it is, "How should standards be approached as a professional problem and how can I as a standards engineer contribute to its solution?"

Dr A. V. Astin, Director of the National Bureau of Standards, Washington, D. C., speaking on Government-Industry Cooperation in Standards at the Society's banquet September 24, emphasized the relationship between the functions of the National Bureau of Standards and the American Standards Association. Standards for physical measurement have always been recognized as the responsibility of Government, he said. As for calibration of weights and measures, the Bureau desires to do as little as possible other than to calibrate the calibrating instruments. The more industry sets up its own calibrat-

Carl Heller, *vice-chairman, Metropolitan New York Section, (left) presents certificate and check to Girton Carle, Link Aviation Company, for winning paper in contest for best paper on some phase of standardization.*

Interested audiences *applied what they heard to their own problems. Not content with information contained in prepared papers they gathered at end of each session to ask questions. Here, A. H. King, IBM, Poughkeepsie, continues discussion of data processing machines.*

ing facilities, the better it will be for all, Dr Astin declared. He mentioned the work on standard screw threads as an example of cooperation between government and industry, with all government agencies represented in the Interdepartmental Screw Thread Committee, and cooperating in development of American Standards through ASA Sectional Committee B1. Also through cooperation with ASA, unification of screw thread standards has been developed with the other inch-using countries—the United Kingdom and Canada.

Management's problems in standardization were considered at the opening technical session, sponsored by the Hartford Section of the Society. Dr John Gaillard, Management Counsel, and George Habach, vice-president of the Worthington Company, were speakers. Dr Gaillard said that a basic problem facing the standards engineer was to get general acceptance of the modern conception of standardization as an organized activity forming an integral part of the management of an enterprise. Handled this way, standardization would have the greatest value to top executives in one of their major functions: planning for the future, he said.

The active support of middle management is especially important to standards engineers, declared Mr Habach. "While engineering, purchasing, inspection, and parts service departments recognize the many advantages to them of standards, the other departments find less direct value and may, therefore, have less interest," he said. "The standards engineer must recognize these differences in interest and carefully formulate his programs accordingly." Speaking of American Standards, he said, "Management generally endorses cooperation in the preparation of American Standards and industry standards."

The Technique and Preparation of Standards was the subject of a session sponsored by the Washington, D. C. Section. T. R. Rideout, Consulting Engineer and Gearing Specialist, and Everett Woerter, chairman of the Joint Standards Committee, American Machine and Foundry Company, were the speakers.

Gears, unlike bearings or bolts, are special purpose parts, Mr Rideout said, and beyond the adoption of existing standards for fundamentals, the gear elements, and quality, there is no universally suitable technique for the preparation of all-inclusive company standards for gears as such. He described the standards prepared by the American Gear Manufacturers Association and the American Standards for gearing, recommended their use, and questioned the need for deviating from them. He also stressed the educational value of standards and the importance of standards in maintaining quality to insure performance.

Mr Woerter described the work of the Joint Standards Committee of which he is chairman. The committee is comprised of engineering and manufacturing representatives from each of the American Machine & Foundry Company facilities, he said. It reviews proposed standards to insure the formulation of standards that are of equal value to each of the 56 AMF plants and laboratories regardless of product line. The work of the committee is based on the premise "there is no value in standards merely for the sake of standardizing." Standards have value only when by establishing them you may expect results in economy, simplified operations, or safeguarding of persons or property, he said.

Government - industry cooperation was discussed at SES banquet by Dr A. V. Astin, Director of the National Bureau of Standards.

The Hamilton-Toronto and Montreal Sections sponsored the session on Sources of Information for Preparing Standards.

The great amount of information available in different fields of standards—government, professional and technical societies, and trade associations—should be utilized whenever applicable, declared S. P. Kaidanovsky, Consulting Engineer. Their use will save time and money and keep the user up to date with industry technological developments. He gave detailed information on the sources of information from such organizations. An encyclopedia of all standards work is needed, he said.

Anderson Ashburn, Managing Director, *American Machinist,* commented that any textbook is likely to be several years old when it is first received from the printer. A magazine will be a month or six weeks out of date. Engineers have difficulty keeping up with technical magazines but do they have time to conduct all the personal research needed to find the new developments now given in the magazines, he asked. In most cases, only four or five magazines will keep the engineer up to date with what is going on in his field. He called attention to the listing of articles under the heading "Standardization" and "Standards" in the Industrial Arts Index and in the Engineering Index. In both cases, references to THE MAGAZINE OF STANDARDS make up the bulk of the listing. He also suggested that standards engineers use technical magazines to publicize the need for standards or differing views on standards.

Rowen Glie, Supervisor of Standards, W. L. Maxson Corporation, called on publishers of magazines to present their material so engineers can use the articles easily for reference. Engineers have no time to read all of the articles published in technical books and magazines, he said. In order to permit engineers to

make use of information available, magazines must be redesigned to permit easy separation and filing of articles, thus providing the engineer with a memory, not just with information.

The session on Making Standards Information Available, sponsored by the Detroit Section, logically followed that on Sources of Information for Preparing Standards.

Data processing machines—both punch card and electronic computer—have proven their versatility in handling and solving many of the problems in government, business, and scientific fields, pointed out A. H. King, Manager, Standards Engineering Services Section, International Business Machines. Why not use these same machines to handle and solve many of the problems in a parts standardization program? he asked. IBM's Standards Engineering Department has done so with remarkable results. Parts of all kinds are cataloged according to their dimensions or characteristics, or both, to provide a ready reference to parts for new applications. Analysis of the new applications provides guidance in the development of new or improved standards. Continuing analysis determines the effectiveness of the standards. Guesswork and opinion are eliminated.

Clifford W. Straitor, Jr, Standards Engineer, Detroit Edison Company, speaking on Methods of Reproducing Standards, pointed out that the various methods of duplication should be investigated, keeping in mind the type of material to be produced in order to use these methods to the best advantage. He showed how the Detroit Edison Company uses the xerography process and the offset process for producing its Standards Catalog. He also pointed out advantages and disadvantages of five other methods of reproducing documents.

Cooperative Efforts Between Standards and Other Departments was the subject of a session sponsored by the Philadelphia Section. J. L. Harris, Manager, Engineering and Quality Control, Standard Pressed Steel Corporation, described how his company works to the principle that dependable interchangeability demands wide use of acceptable standards that can be easily communicated, clearly understood, and capable of close administrative and operational controls. Standards Engineering consolidates and publishes the standards that govern the shop; Sales is informed of the standard characteristics of the product; and Quality Control is the enforcement agency to insure conformance. Some quality characteristics are measurable; some are not, he explained. For those that are, methods of measurement must be standardized, if possible. Where human judgment enters, Quality Control most often does the judging. However, close liaison between Standards Engineering and Quality Control is essential to the intelligent use of standards.

Speaking on Design and Standards, Madhu S. Gokhale, Drafting Coordinator, Defense Electronic Products, Radio Corporation of America, pointed out that it is not too unusual an attitude on the part of some designers to consider standardization a thing apart. It is necessary, therefore, he said, to stress the role of standards as an aid rather than a restriction to these designers. They should be urged to consult and apply standards in their designs in the same manner that they would use established mathematical and physical formulas. The ultimate goal is not merely maximum use of standards in a design, Mr Gokhale said. It is to develop a type of design engineer who uses standardization because standards have become part of his design technique. Standards would then release the designer from the repetitive burden of evaluating and selecting from wide varieties.

E. Philip Kron, Assistant Director of Purchasing, Eastman Kodak Company, described how Eastman uses standards to bring about cost reduction through more effective buying.

The relatively new problem of "reliability" of components was the subject of a session entitled Reliability and the Standards Engineer, sponsored by the Pittsburgh Section. C. M. Ryerson, Reliability Administrator, Radio Corporation of America, presented the subject from the viewpoint of industry. James Bridges, Director of Electronics, Office of Assistant Secretary of Defense (Research and Engineering), spoke on the Military Reliability Program.

The session on "Cost Reduction," winding up the technical sessions, was sponsored by the Society's Boston Section.

William L. Healy, a Specialist in the Switchgear and Control Division of the General Electric Company, spoke on Value Analysis and Design. Value Analysis has been described as the "hottest thing in purchasing," he said. *Purchasing Magazine's* May issue calls it the big opportunity of the purchasing agent. "The concept of value analysis is so broad and so deep that it may obsolete present methods in the next decade," he said. Value Analysis is applicable to any area of production whether it be engineering, design, planning, or manufacturing. It is a philosophy or way of life in which the individual learns to look objectively and with imagination at an object, a material, an operation, a service, comparing the cost of all these things with the function performed. The engineer or designer takes a second look to make sure that the latest methods, the newest material, and production techniques employing all known standards are included. In other words, he asks the question, "Is it worth the money?" Mr Healy used actual examples and demonstrations illustrating the application of the principles of value analysis to design and also illustrating the wasteful costs resulting when known standards are not considered.

J. H. Bergen, Director, Engineering Services Laboratory, American Machine & Foundry Company, described how his company has applied simplified drafting practices for cost reduction.

A new development in drafting paper was described by F. B. Astley, Manager, Sales Service Photo Products Department, E. I. du Pont de Nemours and Company.

The Seventh Annual Meeting of the Society will be held at the Benjamin Franklin Hotel, Philadelphia, September 22-24, 1958.

George Noble *(right), first Canadian member to receive SES Fellowship, accepts certificate from Dr John Gaillard, chairman of the Awards Committee.*

Howard Coonley *(right) was presented an Honorary Life Fellowship. Madhu S. Gokhale, past president of the Society, here presents Fellowship certificate.*

SES Awards Fellowships

THE STANDARDS Engineers Society announced award of its highest distinction, Honorary Life Fellowship, to Howard Coonley, and award of Fellowships to three of its members, at the Sixth Annual Meeting Awards Luncheon, September 25. Cyril Ainsworth, Assistant Secretary and Technical Director, American Standards Association; W. L. Healy, Specialist, Switchgear and Control Division, General Electric Company, Philadelphia; and George Noble, Dominion Engineering Company, Ltd, Montreal, Canada, were selected by the Society to receive the Fellowship awards.

Howard Coonley, vice-chairman of the Board, Research-Cottrell, Inc, New York, is a past president of the National Association of Manufacturers, the American Standards Association, and the International Organization for Standardization. He was instrumental in founding the Manufacturers Standardization Society of the Valve and Fittings Industry and served as its General Chairman for 40 years. He headed the conservation, standardization, simplification, and specification work of the War Production Board during World War II.

His important contributions to standardization not only during the war but also in development of the American Standards Association and the International Organization for Standardization were recognized with the establishment of a medal named for him. The Howard Coonley Medal is presented annually by the American Standards Association to an executive who has given outstanding services to the national economy through voluntary standardization.

Cyril Ainsworth, in addition to his work with the American Standards Association, has been president of the American Museum of Safety since 1951, and is Secretary and one of the Directors of the Greater New York Safety Council. He was a member of the American delegation to the Inter-American meeting of Experts on Technical Standards called by the Inter-American Economic and Social Council of the Organization of American States. The meeting was held at Rio de Janeiro, Brazil, during the week of September 23. Presentation of the Fellowship certificate will be made to Mr Ainsworth later this year.

Mr Healy is co-author of the book, *Simplified Drafting Practices,* and has been active in the General Electric Company on materials standardardization and on the relatively new technique of value analysis. He was president of the Standards Engineers Society from 1953 to 1954, during which time he stimulated the growth of the Society with organization of six local chapters. He is also active in the national committee on drawing and drafting practice, Committee Y14 of the American Standards Association.

Mr Noble is the first Canadian to be awarded the grade of Fellow in the Society. He has been active in both national and international standards work. He has been a member of the Canadian team of the ABC (American, British, Canadian) Group for the Unification of Engineering Drawing Standards since 1950. He was instrumental in forming the first Canadian section of the Society, and is chairman and Sectional Director of the Montreal Section.

NEWS BRIEFS.....

• It takes three volumes to report the proceedings of the 1957 Nuclear Congress held in Philadelphia last March. The American Society of Mechanical Engineers is publishing the three-volume set. The first two volumes are entitled *Advances in Nuclear Engineering* and the third *Hot Laboratory Operation and Maintenance*. The session on standardization planning in the nuclear field is reported in Volume II. The entire set can be ordered from ASME, 29 West 39 Street, New York 18, N.Y., at $45.00.

• J.R. Townsend, past chairman of ASA's Standards Council, and since 1952 Director of Materials and Standards Engineering at Sandia Corporation, has taken up new duties as Special Assistant to the Assistant Secretary of Defense for Research and Engineering in Washington, D.C. He is also serving as Director of the Office of Fuels, Materials and Ordnance.

Mr Townsend was president of the American Society for Testing Materials for 1945-46 and represents the Society on the Standards Council of the American Standards Association. He was chairman of the Council in 1954, and is a member of the Board of Directors of ASA.

He has served as consultant to the Assistant Secretary of Defense, Research and Development, since 1955, the Office of Defense Mobilization since 1956, and the Central Intelligence Agency since 1952.

He represents the American Standards Association on the Advisory Committee to the National Bureau of Standards. Mr Townsend also organized and is a member of the Committee on Materials, of the Research and Development Board.

• The science of anthropometry (human measurements) is being put to use by the British Standards Institution. A new BSI Advisory Committee on Anthropometric Evidence for Equipment Design, recently organized, had before it at its first meeting requests from BSI technical committees for recommended dimensions for office furniture and for kitchen furniture for canteens. The committee is studying the report of a survey of women's measurements recently completed by the Clothing Industry Development Council, and published by the Board of Trade. The report tabulates a complete series of measurements carried out on 5,000 women representing the entire adult female population of the country. The BSI has invited the clothing trade associations to take up the problem of a sizing system for women's garments based on these measurements.

Sizes of children's clothing are also being considered. BSI has studied a number of reports of measurements of children as a background for this work. One of the reports studied was published by the Department of Anatomy of Birmingham University; another was the work of a Swedish professor of statistics which formed the basis for the system of sizing children's garments just introduced in Sweden; and a third was the system for sizing children's garments published by the Canadian Government Specifications Board last year. BSI has also been in touch with retailers and trade associations to obtain practical information on garment sizes.

Recommendations based on physiological and anthropometric studies have been included in the British Standard for Office Chairs, B.S. 2582:1955. A standard for school dining tables and chairs and a forthcoming specification on classroom chairs and tables also take account of the anthropometric surveys.

• A new color scale to measure the degree of refinement of petroleum products has been devised by the National Bureau of Standards in cooperation with the American Society for Testing Materials. Glass standards to match the color specifications of the new scale are now being made in this country.

In setting up the new color scale at the request of a research group within ASTM's Committee on Petroleum Products and Lubricants, the Bureau measured the colors of 49 samples of petroleum in the pale yellow to orange range. Based on these measurements, a relocated and respaced color scale was calculated. The new scale with tolerances is specified in terms of spectral transmittances and the CIE (Commission Internationale de le'Eclairage) standards observer.

With the financial support of the ASTM committee, the National Bureau of Standards, in cooperation with a supplier of glass color standards, designed a set of glasses meeting the desired tolerances.

In April 1957 the research group of the committee approved a new tentative method for color-grading petroleum products based on the revised color scale. This decision was made after extensive cooperative tests showed that agreement between laboratories using the revised color scale was possible. Formal approval of the new method by the Committee on Petroleum Products and Lubricants was announced at the recent ASTM annual meeting in Atlantic City.

Gaillard Seminar on Industrial Standardization

New York, January, 1958

The next Gaillard Seminar on Industrial Standardization, following the November, 1957, session in San Francisco, will be held in the Engineering Societies Building, New York City, from January 20 through 24, 1958. The seminar will consist of ten conferences, one every morning and afternoon, Monday through Friday.

For details and registration, write to Dr John Gaillard, Box 273, Route 1, Briarcliff Manor, N.Y.

FROM OTHER COUNTRIES

Members of the American Standards Association may borrow from the ASA Library copies of any of the following standards recently received from other countries. Orders may also be sent to the country of origin through the ASA office. Titles are given here in English, but documents are in the language of the country from which they were received. An asterisk * indicates that the standard is available in English as well. For the convenience of readers, the standards are listed under their general UDC classifications. In ordering copies of standards, please refer to the number following the title.

621.9 TOOLS. MACHINE TOOLS. MACHINING

Australia (SAA)

Dimensions of tungsten carbide tips and tools B.127-1957

Belgium (IBN)

Diameters of tool shanks and shank squares NBN 98

Bulgaria

37 stds (in 1 volume) for different type of taps BDS series 945
Tee-slots BDS 2483
Milling cutters, general survey BDS 2521
Spindle taper end of grinders BDS 2560

Germany (DNA)

Round punches up to 14.4 mm in diameter DIN 9861

India (ISI)

Axes IS 703

Japan (JISC)

Hand wood saws JIS B 4804*
Heavy duty cutting nippers JIS B 4635*
Small tool shank squares JIS B 4002
Morse taper shank and sockets JIS B 4003
13 stds for different milling cutters JIS B 4201/6,-8/9,-11/2,-17,-19/20
2 stds for twist drills, straight and Morse taper shanks JIS B 4301/2
2 stds for reamers, Morse taper and straight shanks JIS B 4401/2
2 stds for nut taps for metric and Whitworth coarse threads JIS B 4433/4
5 stds for hack-saw frames JIS B 4615/9
3 stds for bench vices JIS B 4620/2
14 stds for accuracy testing of different machine tools JIS B 6201/14
2 stds for running tests of machine tools JIS B 6231/2

Poland

3 stds for different carpenter's saws PN D-54216,-18,-20
2 types of hand bow saws PN D 54333
3 stds for circular saws for wood PN D-54501/3
Grinding wheels, cut-type PN M-59175
2 stds for grinding wheels, disc type PN M-59184/5
Mechanical frame presses PN M-67012
Sieves, square wire netting PN M-94002
Wrenches 85 mm—150 mm openings PN M-65011
Saws, dovetail PN D-54217
Grinding Wheels, taper PN-M-64972
End wrenches, adjustable PN M-64972
Pins, straight, 10 mm to 50 mm diam. PN M-66120

Roumania (CSS)

Circular saws for wood STAS 1071-56
Steel blanks for files STAS 1669-56

United Kingdom (BSI)

Pinion type cutters for spur gears, 4 D.P. to 20 D.P. BS 2887:1957

USSR

End milling cutters GOST 8237-56
Mechanical shears GOST 8248-56
Tap holding chucks GOST 8255-56
Mechanical press, automatic GOST 8260-56
10 stds for different devices for jig-holders GOST 4083 thru 4092-57
Reamers with welded hard alloy tips GOST 5735-57
Veneer peeling machine, over-all dimensions GOST 6035-57
Planers, electrically operated GOST 8306-57
Universal grinding lathe GOST 8308-57

665.4/.5 MINERAL OILS, WAXES

France (AFNOR)

Oils and derivatives. Determination of tetraethyl lead contents in liquid fuels NF M 07-014
Determination of conventional melting point of crude vaselines and petroleum waxes NF T 60-121

Japan (JISC)

Petroleum asphalt JIS K 2207
Turbine oil JIS K 2213
Conversion table between specific gravity and volume of crude oil and petroleum products JIS K 2250
4 stds for fuel gas JIS K 2301/4
12 stds for different tests of petroleum products JIS K 2510/3,-15/7,-30/4

Netherlands (HCNN)

Oxidation characteristics of inhibited steam-turbine oils NEN 3024

Poland

6 stds for solid mineral oil greases PN C-series 04
Motorfuel, classification of PN C96025
Xylol 120/145 PN C-97026
Toluol PN C-97027
Determination of tetraethyl lead in gasoline PN C-04039
Determination of corrosive action of mineral oils on metals PN C-04093
Asphalt, insulating PN C-96174

Spain (IRATRA)

Petroleum ether, test methods for UNE 55 016

Switzerland (SNV)

Quality specifications for liquid fuel SNV 81160
Quality specifications for gasoline for "Otto" motors SNV 81161

United Kingdom (BSI)

Determination of acid and base numbers of petroleum products BS 2834:1957
Determination of closed flash-point of petroleum products by means of the Pensky-Martens apparatus BS 2839:1957

USSR

Gasoline for motorcars GOST 2084-56
Ethyl-benzene GOST 5986-56
Aviation gasoline GOST 6667-56

676 PAPER AND PULP INDUSTRY

Bulgaria

7 stds, bound together, for different kinds of paper and pasteboard BDS 2/4, 147/9, 324

Czechoslovakia (CSN)

10 stds for testing cellulose CSN series 50 02

France (AFNOR)

Postal envelopes, sizes and layout NF Q 31-001
Postal cards, picture, sizes and layout NF Q 31-008
Determination of moisture content in paper and pasteboard NF Q 03-003

Germany (DNA)

Roofing paper with bituminous layer on both sides DIN 52128

Netherlands (HCNN)

Testing of paper: determination of colofonium V 3121

New Zealand (NZSI)

School paper stationery 362, March 1956

Poland

4 stds for different tests of paper PN P-series 04
5 stds for writing, typewriting and printing paper PN P-series 95
Packing paper PN P-96002

Roumania (CSS)

22 stds for different tests of paper and pressboard STAS 4737, 4740/2, 4744/8, 4750/63 -55

Union of South Africa (SABS)

Standard spec for wrappers for citrus and deciduous fruit SABS 526-1956

United Kingdom (BSI)

Vegetable-parchment/aluminum-foil laminates (parchfoil) for wrapping dairy and other food products BS 2758:1956

USSR

4 stds for testing paper GOST 7687/90 -55
Backing stock for diagram charts of recording instruments GOST 7717-55
Drawing paper GOST 597-56
Paper for making small arm cartridges GOST 876-56
Parchment, special, thin GOST 2995-56
Pasteboard for box manufacture GOST 7933-56
Determination of machine- and cross-direction of paper and paste-board GOST 7585-56
Bookbinder's board GOST 7950-56
Paper and pasteboard: sampling and acceptance rules GOST 8047-56
Paper, sizing test GOST 8049-56
Tar paper for packing GOST 515-56
Impregnated insulating paper GOST 3441-55
Paper for printing, thin GOST 7317-55
Paper stock for playing cards GOST 7114-54
Writing paper GOST 3331-55
Paper for goffering GOST 7377-55
Paper for typewriter carbon copies GOST 7374-55
5 stds for manufacturing and testing of pasteboard GOST 7376, 7420, 7497, 7626/7 -55
Mechanically operated pulp sedimentation tank GOST 7384-55
Specially pressed pasteboard for automobile body lining GOST 7270-54
9 stds for different tests of paper and pasteboard GOST 7500/1, 7514, 7581/3, 7585, 7628/9 -55

698 FINISHING AND DECORATING TRADES

Austria (ONA)

Rules for housepainting work ÖNORM B 2230
Glazing glass sheets, testing ÖNORM B 3710

Denmark (DS)

Wallpaper. Roll length, width of roll, width of printing DS F 1001

USSR

Linoleum GOST 7251-54

BOOKS.....

Design of Die Castings. *By Gustav Lieby. 1957. 200 pp. First edition of English translation from the original German version. American Foundrymens' Society, Golf & Wolf Roads, Des Plaines, Ill.* $8.00

Information on castings produced by the hot- or cold-chamber die-casting process is given in this first translated edition. Numerical values have been converted from the metric system to that more universally used in the United States. Appended to the translation is a bibliography of references on die casting as well as ASTM specifications for die-casting alloys. The text is illustrated throughout by 135 figures and 16 tables. Principal chapters cover:

- Methods and processing principles
- Fundamental features of die-cast products
- Die-casting materials and their application
- Suggestions for die design and construction
- Dies for production of die-cast parts
- Obtainable precision
- Determination of tolerances

Compilation of Steel Piping Materials. *1957. Paper cover. 6 x 9. 455 pp. American Society for Testing Materials. 1916 Race Street, Philadelphia 3, Pa.* $4.50

Developed by ASTM Committees A-1 and A-10, this volume contains 60 specifications, one method of test, and one classification. Twenty-seven of these standards are new or substantially revised since the previous edition of September 1955. Among the topics covered are pipes, boilers, superheaters, miscellaneous tubes, steel tubes, heat-exchanger and condenser tubes, and specifications for castings, forgings, bolts, and nuts.

Several of these standards have been approved by the American Standards Association and many of the specifications are incorporated in the ASME Boiler and Pressure Vessel Construction Code.

1,687 Reasons Why. *April 1957. 29 pp. American Standards Association, Inc, 70 East 45th Street, New York 17, N.Y. No Charge.*

It would cost an individual company perhaps $500,000 to develop two standards that it can buy from the American Standards Association (ASA) for $4.50.

These are two of the 1687 reasons why it pays American industry to invest more in American Standards. The 1687 reasons are the 1687 American Standards approved by ASA in almost every field of the American economy.

Other points made by the booklet are: Somewhere along the line American Standards save a company money in just about everything it buys; more American Standards would save the company more money; lack of more American Standards is costing the company money; American Standards make it easier to do business with the Federal Government; international standards help the American exporter.

The Builder's Best Tool. *American Standards Association, 70 East 45 Street, New York 17, N. Y. No charge.*

This pamphlet tells the builder that modular measure helps him estimate and sell the job, offsets rising wages, cuts costs of materials, increases safety, eliminates waste at site of building, and protects the builder against claims.

"Too bad when there's a real fire for once the hoses don't fit."
Swedish standards association dramatizes the importance of standard sizes.

AMERICAN STANDARDS UNDER WAY

Status as of October 25, 1957

Legend — *Standards Council* — Approval by Standards Council is final approval as American Standard; usually requires 4 weeks. *Board of Review* — Acts for Standards Council and gives final approval as American Standard; action usually requires 2 weeks. *Standards Board* — Approves standards to send to Standards Council or Board of Review for final action; approval by standards boards usually takes 4 weeks.

Note — Send check when ordering standards listed as published to avoid service charge for handling.

BUILDING AND CONSTRUCTION

In Standards Board

Insulating Fire Brick, Classification of, ASTM C 155-57; ASA A111.22-(Revision of ASTM C 155-47; ASA A111.22-1955)
Sponsor: American Society for Testing Materials

Places of Outdoor Assembly, NFPA 102; ASA Z20.3-(Revision of Z20.3-1950)
Sponsor: National Fire Protection Association; Building Officials Conference of America

Standards Submitted

Gypsum Plasters, Specifications for, ASTM C 28-57; ASA A49.3-(Revision of ASTM C28-50; ASA A49.3-1951)
Sponsor: American Society for Testing Materials

Billet-Steel Bars for Concrete Reinforcement, Specifications for, ASTM A 15-57T; ASA A50.1-(Revision of ASTM A 15-39; ASA A50.1-1939)

Rail-Steel Bars for Concrete Reinforcement, Specifications for, ASTM A 16-57T; ASA A50.2-(Revision of ASTM A 16-35; ASA A50-2-1936)
Sponsor: American Society for Testing Materials

Structural Clay Load-Bearing Wall Tile, Specifications for, ASTM C 34-57; ASA A74.1- (Revision of ASTM C 34-53; ASA A74.1-1953)
Sponsor: American Society for Testing Materials

Structural Clay Non-Load-Bearing Tile, Specifications for, ASTM C 56-57; ASA A76.1- (Revision of ASTM C 56-52; ASA A76.1-1953)
Sponsor: American Society for Testing Materials

Structural Clay Floor Tile, Specifications for, ASTM C 57-57; ASA A77.1-(Revision of ASTM C 57-52; ASA A77.1-1953)
Sponsor: American Society for Testing Materials

Brick, Methods of Sampling and Testing, ASTM C 67-57; ASA A82.1- (Revision of ASTM C 67-50; ASA A82.1-1951)
Sponsor: American Society for Testing Materials

Building Brick (Solid Masonry Units Made from Clay or Shale), Specifications for, ASTM C 62-57; ASA A98.1-(Revision of ASTM C 62-50; ASA A98.1-1953)
Sponsor: American Society for Testing Materials

Facing Brick (Solid Masonry Units Made from Clay or Shale), Specifications for, ASTM C 216-57; ASA A99.1- (Revision of ASTM C 216-50; ASA A99.1-1953)
Sponsor: American Society for Testing Materials

Inorganic Aggregates for Use in Gypsum Plaster, Specifications for, ASTM C 35-57T; ASA A107.1- (Revision of ASTM C 35-53T; ASA A107.1-1954)
Sponsor: American Society for Testing Materials

Axle-Steel Bars for Concrete Reinforcement, Specifications for, ASTM A 160-57T; ASA G43.1- (Revision of ASTM A 160-39; ASA G43.1-1942)
Sponsor: American Society for Testing Materials

High-Strength Steel Castings for Structural Purposes, Specifications for, ASTM A 148-57; ASA G52.1- (Revision of ASTM A 148-44; ASA G52.1-1944)
Sponsor: American Society for Testing Materials

ELECTRIC AND ELECTRONIC

American Standards Approved

Flexible Cord and Fixture Wire, Safety Standard for, C33.1-1957 (Revision of C33.1-1954)
Sponsor: Underwriters' Laboratories

Rotating Electric Machinery Forming a Part of the Power Equipment on Electrically Propelled Railway Cars, Railway Locomotives, and Coaches (Trolley and Prime Mover), C35.1-1957 (Revision of AIEE 11-1943; ASA C35.1-1943)
Sponsor: American Institute of Electrical Engineers

In Board of Review

Definitions of Electrical Terms, Group 95, Miscellaneous, C42.95-(Partial revision of C42-1941)
Sponsor: American Institute of Electrical Engineers

Fluorescent Lamp Reference Ballasts, Specification for, C82.3- (Revision of C82.3-1956)
Sponsor: Electrical Standards Board

In Standards Board

Soft or Annealed Copper Wire, Specifications for, ASTM B 3-56; ASA C7.1-(Revision of ASTM B 3-54T; ASA C7.1-1955)

Tinned Soft or Annealed Copper Wire for Electrical Purposes, Specifications for, ASTM B 33-56T; ASA C7.4- (Revision of ASTM B 33-53T; ASA C7.4-1953)

Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft, Specifications for, ASTM B 8-56; ASA C7.8-(Revision of ASTM B 8-53; ASA C7.8-1953)

Lead-Coated and Lead-Alloy-Coated Soft Copper Wire for Electrical Purposes, Specifications for, ASTM B 189-56T; ASA C7.15- (Revision of ASTM B 189-53T; ASA C7.15-1953)

Cored, Annular, Concentric-Lay-Stranded Copper Conductors, Specifications for, ASTM B 226-56; ASA C7.16-(Revision of ASTM B 226-52; ASA C7.16-1953)

Concentric-Lay-Stranded Copper Covered Steel Conductors, Specifications for, ASTM B 228-56; ASA C7.18- (Revision of ASTM B 228-52; ASA C7.18-1953)

Concentric - Lay - Stranded Copper and Copper Covered Steel Composite Conductors, Specifications for, ASTM B 229-56; ASA C7.19- (Revision of ASTM B 229-52; ASA C7.19-1953)

Copper Bus Bar, Rod, and Shapes, Specifications for, ASTM B 187-55; ASA C7.25- (Revision of ASTM B 187-52; ASA C7.25-1953)

Seamless Copper Bus Pipe and Tube, Specifications for, ASTM B 188-56; ASA C7.26- (Revision of ASTM B 188-52; ASA C7.26-1953)

Determination of Cross-Sectional Area of Stranded Conductors, Method for, ASTM B 263-56T; ASA C7.29- (Revision of ASTM B 263-53T; ASA C7.29-1953)

Three-Quarter Hard Aluminum Wire for Electrical Purposes, Specifications for, ASTM B 262-56; ASA C7.35- (Revision of ASTM B 262-55; ASA C7.35-1956)

Tinned Hard-Drawn and Medium-Hard Drawn Copper Wire for Electrical Purposes, Specifications for, ASTM B 246-56T; ASA C7.37-

Silver-Coated Soft or Annealed Copper Wire, Specifications for, ASTM B 298-56T; ASA C7.38-
Sponsor: American Society for Testing Materials

Specialty Transformers, Requirements and Terminology for, C89.1-
Sponsor: National Electrical Manufacturers Association

MATERIALS AND TESTING

In Board of Review

Natural Muscovite Mica Based on Visual Quality, Specifications for, ASTM D 351-57; ASA C59.27- (Revision of ASTM D 351-53T; ASA C59.27-1955)
Sponsor: American Society for Testing Materials

MECHANICAL

American Standard Published

Abrasive Discs and Plate Mounted Wheels, Machine Mounting Specifications for, B5.35-1957 $1.50
Describes and illustrates five types of abrasive discs and the plate mounted wheels; and gives specifications for location and size of bolt holes in steel disc wheels and the mounting side of abrasive disc and plate mounted wheels.
Sponsors: American Society of Mechanical Engineers; National Machine Tool Builders' Association; Society of Automotive Engineers; Metal Cutting Tool Institute; American Society of Tool Engineers

In Board of Review

Carbide Blanks and Cutting Tools, B5.36- (Partial revision of B5.22-1950)
Sponsors: American Society of Mechanical Engineers; National Machine Tool Builders' Association; Society of Automotive Engineers; Metal Cutting Tool Institute; American Society of Tool Engineers

In Standards Board

Carbon-Silicon Steel Plates of Intermediate Tensile Ranges for Fusion-Welded Boilers and Other Pressure Vessels, Specifications for, ASTM A 201-57T; ASA G31.1- (Revision of ASTM A 201-54T; ASA G31.1-1956)
Sponsor: American Society for Testing Materials

Molybdenum-Steel Plates for Boilers and Other Pressure Vessels, Specifications for, ASTM A 204-57; ASA G34.1- (Revision of ASTM A 204-56; ASA G34.1-1956)
Sponsor: American Society for Testing Materials

High Tensile Strength Carbon-Silicon Steel Plates for Boilers and Other Pressure Vessels, Specifications for, ASTM A 212-57T; ASA G35.1- (Revision of ASTM A 212-54T; ASA G35.1-1956)
Sponsor: American Society for Testing Materials

Mild- to Medium-Strength Carbon-Steel Castings for General Application, Specifications for, ASTM A 27-57; ASA G50.1- (Revision of ASTM A 27-55; ASA G50.1-1956)
Sponsor: American Society for Testing Materials

MINING

American Standard Published

Roof Bolting Materials in Coal Mines, Specifications for, M30.1-1957 $0.50
Sponsor: American Mining Congress

PAINTS AND VARNISHES

In Standards Board

Tinting Strength of White Pigments, Method of Test for, ASTM D 332-57T; ASA K56.1- (Revision of ASTM D 332-55T; ASA K56.1-1956)
Sponsor: American Society for Testing Materials

Dry Mercuric Oxide, Chemical Analysis of, ASTM D 284-57T; ASA K59.1- (Revision of ASTM D 284-33; ASA K59-1941)
Sponsor: American Society for Testing Materials

PETROLEUM PRODUCTS AND LUBRICANTS

In Standards Board

Melting Point of Paraffin Wax, Method of Test for, ASTM D 87-57; ASA Z11.4- (Revision of ASTM D 87-42; ASA Z11.4-1942)

Cloud and Pour Points, Method of Test for, ASTM D 97-57; ASA Z11.5- (Revision of ASTM D 97-47; ASA Z11.5-1948)

Flash and Fire Points by Cleveland Open Cup, Method of Test for, ASTM D 92-57, ASA Z11.6- (Revision of ASTM D 92-56; ASA Z11.6-1956)

Heat for Combustion of Liquids by Bomb Calorimeter, Tentative Method of Test for, ASTM D 240-57T; ASA Z11.14- (Revision of ASTM D 240-50; ASA Z11.14-1950)

Definitions of Terms Relating to Petroleum, ASTM D 288-57; ASA Z11.28- (Revision of ASTM D 288-53; ASA Z11.28-1953)

Existent Gum in Fuels by Jet Evaporation, Tentative Method of Test for, ASTM D 381-57T; ASA Z11.36- (Revision of ASTM D 381-53T; ASA Z11.36-1953)

Distillation of Plant Spray Oils, Tentative Method of Test for, ASTM D 447-57T; ASA Z11.43- (Revision of ASTM D 447-55; ASA Z11.43-1955)

Kinematic Viscosity to Saybolt Furol Viscosity, Method of Conversion of, ASTM D 666-57; ASA Z11.53- (Revision of ASTM D 666-53; ASA Z11.53-1953)

Oxidation Stability of Aviation Gasoline (Potential Gum Method), Method of Test for, ASTM D 873-57T; ASA Z11.60- (Revision of ASTM D 873-49; ASA Z11.60-1949)

Sulfated Residue from New Lubricating Oils, Tentative Method of Test for, ASTM D 874-57T; ASA Z11.68- (Revision of ASTM D 874-55; ASA Z11.68-1955)

Olefinic Plus Aromatic Hydrocarbons in Petroleum Distillates, Tentative Method of Test for, ASTM D 1019-57T; ASA Z11.71- (Revision of ASTM D 1019-56T; ASA Z11.71-1956)

Water Tolerance of Aircraft Fuels, Method of Test for, ASTM D 1094-57T; ASA Z11.82- (Revision of ASTM D 1094-53; ASA Z11.82-1953)

60 Octane Number Iso-octane-Normal Heptane ASTM Knock Test Reference Fuel Blends by Infrared Spectrophotometry, Test for Analysis of, ASTM D 1095-54; ASA Z11.94-

1,3-Butadiene in C_4 Hydrocarbon Mixture by Ultraviolet Spectrophotometry, Test for, ASTM D 1096-54; ASA Z11.95-

Density and Specific Gravity of Liquids by Bingham Pycnometer, Test for, ASTM D 1217-54; ASA Z11.96-

Unsaturated Light Hydrocarbons (Silver-Mercuric Nitrate Method), Test for, ASTM D 1268-55; ASA Z11.97-
Sponsor: American Society for Testing Materials

PHOTOGRAPHY

American Standards Published

Amateur Roll Film, Backing Paper, and Film Spools, Dimensions for, PH1.21-1956 $1.50
Covers amateur roll films in most common use for hand-held still picture cameras, specifically, those roll films which comprise a length of sensitized film attached to a continuous strip of backing paper, both film and paper being wound upon a flanged spool so as to constitute a daylight-loading unit. Dimensions and tolerances are given for the film, backing paper and spools covered.
Sponsor: Photographic Standards Board

Paper Sheets for Photo-Reproduction of Documents, Dimensions of, PH5.2-1957 $0.25
Sponsor: American Library Association

American Standards Approved

Photographic Sound Record on 35mm Prints, PH22.40-1957 (Revision of Z22.40-1950)

Projector Aperture for 35mm, Anamorphic, 2.35:1 Prints with Squeeze Ratio of 2:1, PH22.106-1957
Sponsor: Society of Motion Picture and Television Engineers

In Standards Board

Photographic Films for Permanent Records, Specifications for, PH1.28- (Revision of Z38.3.2-1945)
Sponsor: Photographic Standards Board

Focal Length Marking of Lenses, PH3.13- (Revision of Z38.4.4-1942)

Distribution of Illuminance Over the Field of a Photographic Objective or Projection Lens, PH3.22-
Sponsor: Photographic Standards Board

Withdrawal Being Considered

Flash Synchronizing Equipment Bipost-Type Connecting Cord Ends and Pins, Z38.4.26-1951

Flash Synchronizing Equipment Bayonet-Type Connecting Cord Ends and Pins, Z38.4.27-1951
Sponsor: Photographic Standards Board

PIPE AND FITTINGS

American Standard Published

Computation of Strength and Thickness of Cast Iron Pipe, Manual for, A21.1-1957 (Revision of A21.1-1939) $1.50
Principles and methods for computation of strength and thickness of cast iron pipe. Shows how the methods may be used to compute the necessary thickness of a pipe under known conditions of internal pressure, earth cover and method of laying, for any specified strength of iron. Tabular schedules of barrel thicknesses for both pit cast and centrifugally cast pipe, for both water or other liquids and for gas, for various field conditions and various pressures.
Sponsors: American Gas Association; American Society for Testing Materials; American Water Works Association; New England Water Works Association

In Standards Board

Forged or Rolled Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service, Specifications for, ASTM A 105-57T; ASA G17.3- (Revision of ASTM A 105-46; ASA G17.3-1947)
Sponsor: American Society for Testing Materials

Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service, Specifications for, ASTM A 182-57T; ASA G37.1- (Revision of ASTM A 182-56T; ASA G37.1-1957)
Sponsor: American Society for Testing Materials

Forged or Rolled Steel Pipe Flanges, Forged Fittings, and Valves and Parts for General Service, Specifications for, ASTM A 181-57T; ASA G46.1- (Revision of ASTM A 181-55T; ASA G46.1-1956)
Sponsor: American Society for Testing Materials

Seamless Copper Pipe, Standard Sizes, Specifications for, ASTM B 42-57; ASA H26.1- (Revision of ASTM B42-55; ASA H26.1-1956)
Sponsor: American Society for Testing Materials

Seamless Red Brass Pipe, Standard Sizes, Specifications for, ASTM B 43-57; ASA H27.1- (Revision of ASTM B 43-55; ASA H27.1-1956)
Sponsor: American Society for Testing Materials

RUBBER INDUSTRY

In Standards Board

Sample Preparation for Physical Testing of Rubber Products, Methods of ASTM D 15-57T; ASA J1.1- (Revision of ASTM D 15-55T; ASA J1.1-1956)
Sponsor: American Society for Testing Materials

SAFETY

In Standards Board

Conveyors, Cableways, and Related Equipment, Safety Code for, B20.1- (Revision of B20.1-1947)
Sponsors: American Society of Mechanical Engineers; Accident Prevention Dept of the Association of Casualty and Surety Companies

TEXTILES

In Standards Board

Methods of Testing and Tolerances for Cotton Sewing Threads, ASTM D 204-56; ASA L14.14- (Revision of ASTM D 204-42; ASA L14.14-1949)

Method of Testing Spun and Filament Yarns Made Wholly or in Part of Man-Made Organic Base Fibers, ASTM D 1380- 56T; ASA L14.90-

Method of Test for Length and Length Distribution of Cotton Fibers by the Array Method, ASTM D 1440-55; ASA L14.91-

Methods of Sampling Cotton Fibers for Testing, ASTM D 1441-54; ASA L14.92-

Method of Test for Fiber Weight per Unit Length and Maturity of Cotton Fibers (Array Method), ASTM D 1442-54; ASA L14.93-

Method of Test for Maturity of Cotton Fibers (Random Sample-Sodium Hydroxide Swelling Method), ASTM D 1443-56; ASA L14.94-

Method of Test for Cross-Sectional Characteristics of Cotton Fibers, ASTM D 1444-56; ASA L14.95-

Method of Test for Strength of Cotton Fibers (Flat Bundle Method), ASTM D 1445-53T; ASA L14.96-

Method of Test for Number of Neps in Cotton Fibers, ASTM D 1446-53T; ASA L14.97-

Method of Test for Length of Cotton Fibers by Fibrograph, ASTM D 1447-54T; ASA L14.98-

Method of Test for Micronaire Fineness of Cotton Fibers, ASTM D 1448-56; ASA L14.99-

Method for Determining the Specific Area and Immaturity Ratio of Cotton Fibers (Arealometer Method), ASTM D 1449-55T; ASA L14.100-

Method of Test for Maturity of Cotton Fibers (Polarized-Light Method, ASTM D 1450-55T; ASA L14.101-

Method of Test for Resistance to Yarn Slippage in Silk, Rayon and Acetate Woven Fabrics, ASTM D 434-42; ASA L14.102-

Method of Test for Yarn Distortion in Woven Fabrics, ASTM D 1336-54T; ASA L14.103-
Sponsors: American Association of Textile Chemists and Colorists; American Society for Testing Materials

WHAT'S NEW ON AMERICAN STANDARDS PROJECTS

Small Tools and Machine Tool Elements, B5—

Sponsors: Metal Cutting Institute; Society of Automotive Engineers; National Machine Tool Builders Association; American Society of Tool Engineers; American Society of Mechanical Engineers

A proposed American Standard on driving and spindle ends for portable air and electric tools is being circulated for comment. The tentative draft was prepared by Technical Committee 28 of the sectional committee, in liaison with the Electric Tool Institute; Compressed Air and Gas Institute; Service Tools Institute; Grinding Wheel Institute; and the U. S. Bureau of Ships. E. L. Connell, Chicago Pneumatic Tool Company, is chairman of Technical Committee 28.

Copies of the tentative draft of Proposed American Standard Driving and Spindle Ends for Portable Air and Electric Tools, B5, may be obtained without charge by writing Frank Philippbar, Standards Department, The American Society of Mechanical Engineers, 29 West 39th Street, New York 18, N. Y.

Power Switchgear, C37—

Sponsor: Electrical Standards Board

"Noteworthy progress is being made in the field of switchgear standardization by the American Standards Association through its Sectional Committee on Power Switchgear, C37, under the chairmanship of V. L. Cox." This is the comment of an article published in *Electrical Engineering*, August 1957.

Since 1950, this group has prepared, and obtained ASA approval, on 16 standards covering a wide range of switchgear products, the article explains. These have all been published by ASA and are available from ASA headquarters to anyone interested in the design, manufacture, application, or use of switchgear.

They include definitions, preferred rating schedules, application guides, guide specifications, and test codes. Among the more important products covered are high and low voltage power circuit breakers, switchgear assemblies, metal-enclosed bus, automatic station control, supervisory control, and associated telemetering and protective relays.

The committee has active subcommittees at work on revision of high and low voltage power circuit breaker standards and on new Proposed American Standards covering automatic circuit reclosers and line sectionalizers, high voltage air switches, high voltage fuses, coupling capacitors, capacitor potential devices, and line traps.

In order that the standards may be most useful to both users and manufacturers, the committee and its subcommittees are composed of nearly equal groups of members from both areas. The members are usually recommended by private and Government user organizations and by the National Electrical Manufacturers' Association (NEMA) representing manufacturers. The work of AIEE technical committees as approved by the AIEE Standards Committee forms the basis for many of the standards developed. Standards on high voltage power circuit breakers also are based on the recommendations of an Edison Electric Institute — Association of Edison Illuminating Companies — NEMA joint Committee on Power Circuit Breakers.

Many of the members of AIEE and user and manufacturer association standardizing committees also are members of the ASA Committee and its subcommittees, thus assuring that the work of ASA will be carried on with full knowledge of the work and thinking of these other groups.

United States participation in international switchgear standardization also clears through the ASA Sectional Committee on Power Switchgear whose chairman is technical advisor on switchgear to the

U. S. National Committee (USNC) of the International Electrotechnical Commission (IEC).

Drawing and Drafting Practice, Y14—

Sponsors: American Society for Engineering Education; The American Society of Mechanical Engineers.

Section 10 on Metal Stampings of the new American Drafting Standards Manual is now being circulated for comment. The proposed standard covers practices commonly used by small parts manufacturers in the production of metal stampings as produced on standard types of punch presses.

Copies of the tentative draft may be obtained without charge by writing Frank Philippbar, Standards Department, The American Society of Mechanical Engineers, 29 West 39th Street, New York 18, N. Y.

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Ruth E. Mason,
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(My commission expires March 30, 1959.)

Standards Outlook

by LEO B. MOORE

Mr Moore is Associate Professor of Industrial Management, Massachusetts Institute of Technology, where he teaches a full-term course in industrial standardization.

Standards and the Manager

There is a constant struggle among the service and staff functions of a company for the interest of management. Largely, this struggle is a competition for management attention where many forces are simultaneously making demands upon the manager. One solution lies in establishment of assured dependence on the manager by reporting directly to him. Many services feel that this is the best answer. Realistically, however, everyone cannot report to the manager, and the typical manager resists such organizational arrangements. For standards, the rising force among the services, this problem might be resolved by a different approach.

The basic situation management faces is that three groups—consumer, investor, and employee—with insistent, yet conflicting, demands are pressing in upon the manager for satisfaction. It is the responsibility of the manager to satisfy these groups and to establish and maintain an equilibrium among their demands so that his enterprise may develop and grow in a competitive economic world. His basic contribution to the business lies in his ability to direct the enterprise by getting results through and with people, making decisions, and communicating them effectively. In all this, the manager stands in the middle, but finds meaning and value in the fact of his contribution.

This bald description of the management position and activity could similarly be used for standardization. It, too, stands in the middle of the various functional groups of the company and must face up to their conflicting aims. The forces of specialization, diversification, uniqueness, and opportunism that reside in areas of the business all impinge on the principles of standardization. The standards group has the responsibility of recognizing and countering these aims. Like that of management, the standards job is one of working with various groups of people, arriving at decisions, and communicating these decisions to the organization. Standards groups are willing to face these problems and to do these things because they make their own unique contribution to the enterprise.

This sameness of experience, position, and activity might well create an affinity of management for standards. But this relationship must come out of an appreciation of this sameness. Nothing on the part of standards could help more than recognition of the simple fact that it is everyone's job to help the manager make better decisions. Sometimes we become so engrossed in our own responsibilities that we forget they were given to us originally by the manager to share his burden with him.

The need, then, is for the standards groups to give repeated evidence in their oral and written efforts of an appreciation of the broader outlook and an understanding of the total management picture. That the decision making and other techniques of standards would be helpful to the manager should be made evident; that standardization as a principle might be valuable to the manager should be made clear. In fact, this might become a guiding force in a company simply because it helped.

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